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Tongass National Forest

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September 2001

Sandy Beach Road Project

Environmental Assessment

United States Department of Agriculture
Forest Service
Alaska Region
Tongass National Forest
Thorne Bay Ranger District
P.O. Box 19001
Thorne Bay, Alaska 99919
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File Code: 1950

Date: September 28, 2001

Dear Reader:

Enclosed is a copy of the Sandy Beach Road Project Environmental Assessment (EA) for your review and comment. This document analyzes one no-action and four action alternatives. The action alternatives are summarized below.

Alternative 2: This proposal would upgrade the following areas to paved, two-lane roads:

- The entire route from Thorne Bay to Ratz Harbor (common route)
- The segment from Ratz Harbor to the Luck Lake Junction
- The segment from the Luck Lake Junction to the Hatchery Y

No new road segments would be constructed.

Alternative 3: This proposal would upgrade two areas to a paved, two-lane road:

- The common route
- The segment from Ratz Harbor to the Luck Lake Junction

Two other areas would be upgraded to paved, one-lane roads with inter-visible turnouts:

- The segment from the Luck Lake Junction to Eagle Creek
- The segment from Eagle Creek to Coffman Cove

No new road segments would be constructed.

Alternative 4: (Preferred Alternative) This proposal would upgrade two areas to paved, two-lane roads:

- The common route
- The segment between Eagle Creek and Coffman Cove

Two other areas would be upgraded to gravel, one-lane roads with inter-visible turn-outs:

- The segment from Ratz Harbor to the Luck Lake Junction
- The segment from Luck Lake Junction to Eagle Creek

Alternative 5: This proposal would improve existing roads and construct a new road segment through the Ratz inventoried roadless area. Two areas would be upgraded to gravel, two-lane roads:

- The common route
- The segment from Eagle Creek to Coffman Cove

The new road segment through the Ratz inventoried roadless area would be constructed as a gravel one-lane road with inter-visible turn-outs. The existing road segment from National Forest Service Road 3030100 to Eagle Creek would be upgraded to the same standard.

The comment period for the EA will close 30 days after the date the public notice is published in the *Ketchikan Daily News*, the newspaper of record. The publication date is anticipated to be October 5, 2001. Please include the following information with you comments:

1. Name, Address, and (if possible) telephone number;
2. Title of the document(s) on which comment is being submitted;
3. Specific facts or comments along with supporting reasons that the person believes the Responsible Official should consider in reaching a decision.

Dave Schmid, Thorne Bay District Ranger, is the official responsible for the decision.

Please send written comments to: Robert Wetherell, Thorne Bay Ranger District, P.O. Box 19001, Thorne Bay, AK 99919. You may call (907) 828-3304 for additional information or if you would like additional copies of this EA.

Sincerely,

DAVID E. SCHMID
District Ranger

TABLE OF CONTENTS

CHAPTER 1

CHAPTER 2

TABLE OF CONTENTS (CONTINUED)

CHAPTER 3

TABLE OF CONTENTS (CONTINUED)

TABLE OF CONTENTS (CONTINUED)

TABLE OF CONTENTS (CONTINUED)

LIST OF FIGURES

LIST OF TABLES

Chapter 1
Purpose and Need

INTRODUCTION

The Forest Service has prepared this Environmental Assessment (EA) to evaluate the potential effects of road improvements on the physical, biological, and social resources in the Sandy Beach Road Project Area (Figure 1-1). The Project Area is located on Prince of Wales Island and is within the Thorne Bay Ranger District, Tongass National Forest, Alaska. This EA discloses the direct, indirect, and cumulative environmental impacts and any irreversible or irretrievable commitment of resources that would result from the proposed action and alternatives.

This EA was developed in cooperation with Alaska Department of Transportation and Public Facilities (ADOT&PF) and the Western Federal Lands Highway Division (WFLHD) of the Federal Highway Administration with the Forest Service serving as the lead agency responsible for the NEPA assessment, project design and construction, and long-term road maintenance.

This EA has been prepared in compliance with the National Environmental Policy Act (NEPA) and other relevant federal and state laws and regulations, according to the format established by Council on Environmental Quality (CEQ) regulations implementing NEPA (40 CFR 1500-1508). It is organized into five chapters.

- Chapter 1 explains the purpose and need for the proposed action and its relation to the Tongass Land and Resource Management Plan (Forest Plan) and certain federal and state policies and regulations. Chapter 1 also describes the NEPA scoping process and identifies the key issues driving the EA analysis.
- Chapter 2 describes and compares the proposed action, alternatives to the proposed action, and a no-action alternative, and summarizes the significant environmental consequences by issue.
- Chapter 3 describes the physical, biological and human environments potentially affected by the proposed action and alternatives, and discloses what potential effects are anticipated.
- Chapter 4 contains references.
- Chapter 5 contains the distribution list.

OVERVIEW

The primary purpose of this chapter is to introduce the Sandy Beach Road Project, explaining what the Forest Service is proposing to do, why the project is needed, and how the project will fit into the Forest Plan. This chapter also introduces the eight resource issues or concerns that will be evaluated in the EA.

PROJECT AREA DESCRIPTION

The project area considered in this EA encompasses 147,442 acres lying between Thorne Bay and Coffman Cove on Prince of Wales Island. The Sandy Beach Road extends approximately 21 miles from Thorne Bay to the National Forest System Road (NFSR) 3030 junction at the south end of Luck Lake. The road north from Thorne Bay follows the east coast of Prince of Wales Island then turns inland near Ratz Harbor, climbing to an alpine pass and then falling back to the Luck Lake Junction at NFSR 3030. NFSR 30 turns west at this junction to connect with NFSR 3030 at the Hatchery Y. From the Hatchery Y, NFSR 3030 continues north and east to Coffman Cove. Turning northeast at the Luck Lake Junction also provides a connection to Coffman Cove on NFSR 3030.

The distance from Thorne Bay to Coffman Cove via the western route from the Luck Lake Junction is about 45 miles. Via the northern route from the junction, the distance is approximately 36 miles.

The current road system was constructed as a single lane gravel road for logging equipment and log truck haul from logging camps in Coffman Cove and Thorne Bay, but travelers have been using Prince of Wales Island in greater numbers during the last decade. The area has become very popular for visitors traveling in recreation vehicles (RVs), and projections by the Inter-Island Ferry Authority (IFA) are for increased RV usage in the next two decades, fostered by the accessibility provided by IFA vessels. Industrial traffic in the form of log trucks, low-boys, and service equipment is expected to continue on the Sandy Beach Road, accessing existing and proposed local manufacturing and barging infrastructure in Thorne Bay.

Existing roads are narrow, with curves and dips that limit sight distances. Surfaces are gravel, and ruts and potholes are common. For the most part, no warning signs or speed limits are posted, and many sheer road cuts are without guard rails.

FOREST PLAN DIRECTION

National forest planning takes place at several levels: national, regional, forest, and project levels. The Sandy Beach Project EA is a project-level analysis; its scope is confined to addressing the significant issues and possible environmental consequences of the project. It does not attempt to address decisions made at higher levels. It does, however, implement direction provided at those higher levels.

The Forest Plan embodies the provisions of the National Forest Management Act, its implementing regulations, and other guiding documents. The Forest Plan sets forth in detail the direction for managing the land and resources of the Tongass National Forest. The Forest Plan is the result of extensive analysis, which is addressed in the Forest Plan FEIS and the 1997 Record of Decision. Where appropriate, the Sandy Beach EA tiers to the Forest Plan FEIS, as encouraged by 40 CFR 1502.20.

Forest Plan Land Use Designations

The Forest Plan land use designations (LUDs) are intended to guide management of National Forest System lands. Each designation provides for a unique combination of activities, practices, and uses. The Sandy Beach Project Area includes eight LUDs.

Figure 1-2 shows the LUD boundaries in the Sandy Beach Project Area. Table 1-1 gives the acreages within the project area of each LUD, and of lands in state or private ownership.

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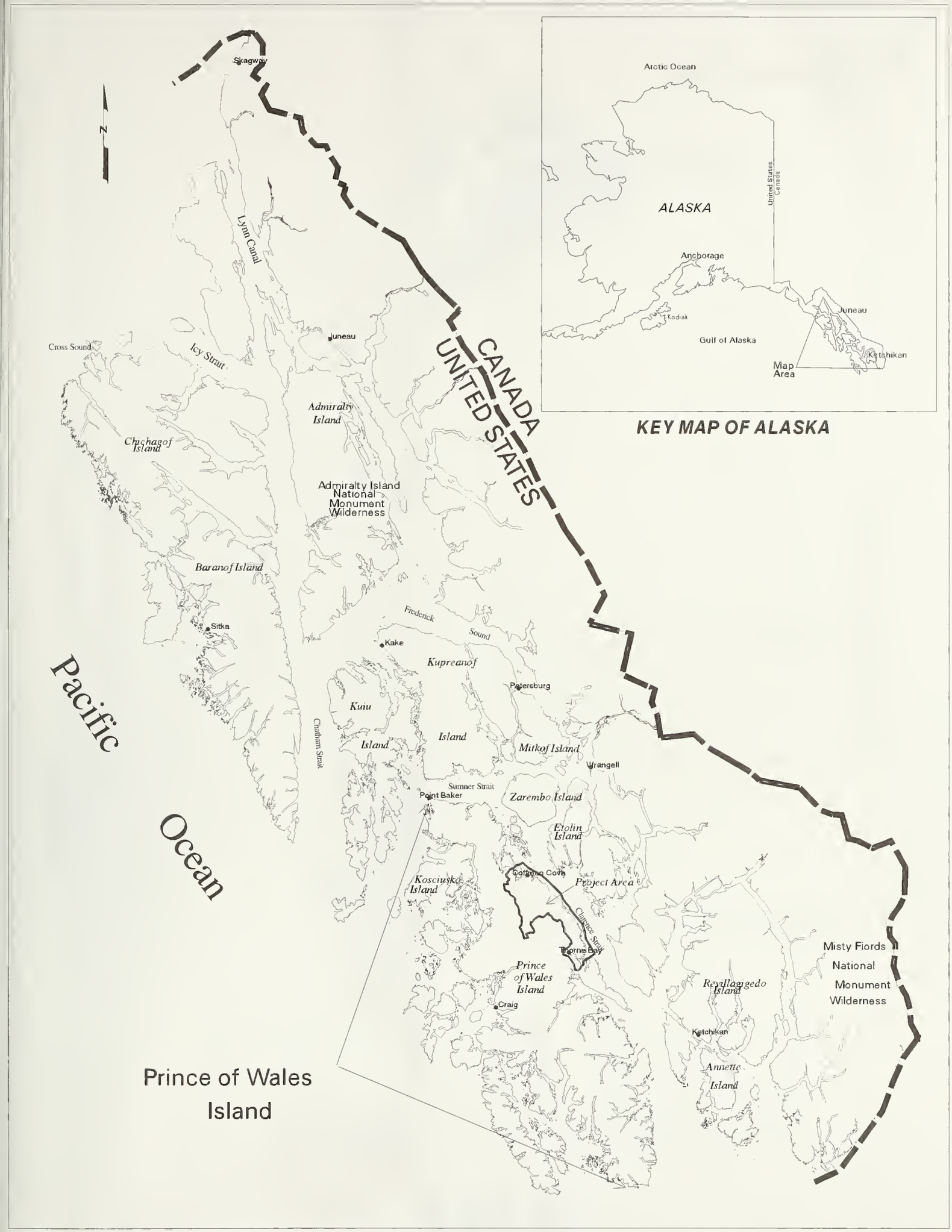

Figure 1-1 Vicinity map of the Sandy Beach Road Project, Prince of Wales Island

Data obtained from
USDA Forest Service, Tongass National Forest, Stikine Area GIS

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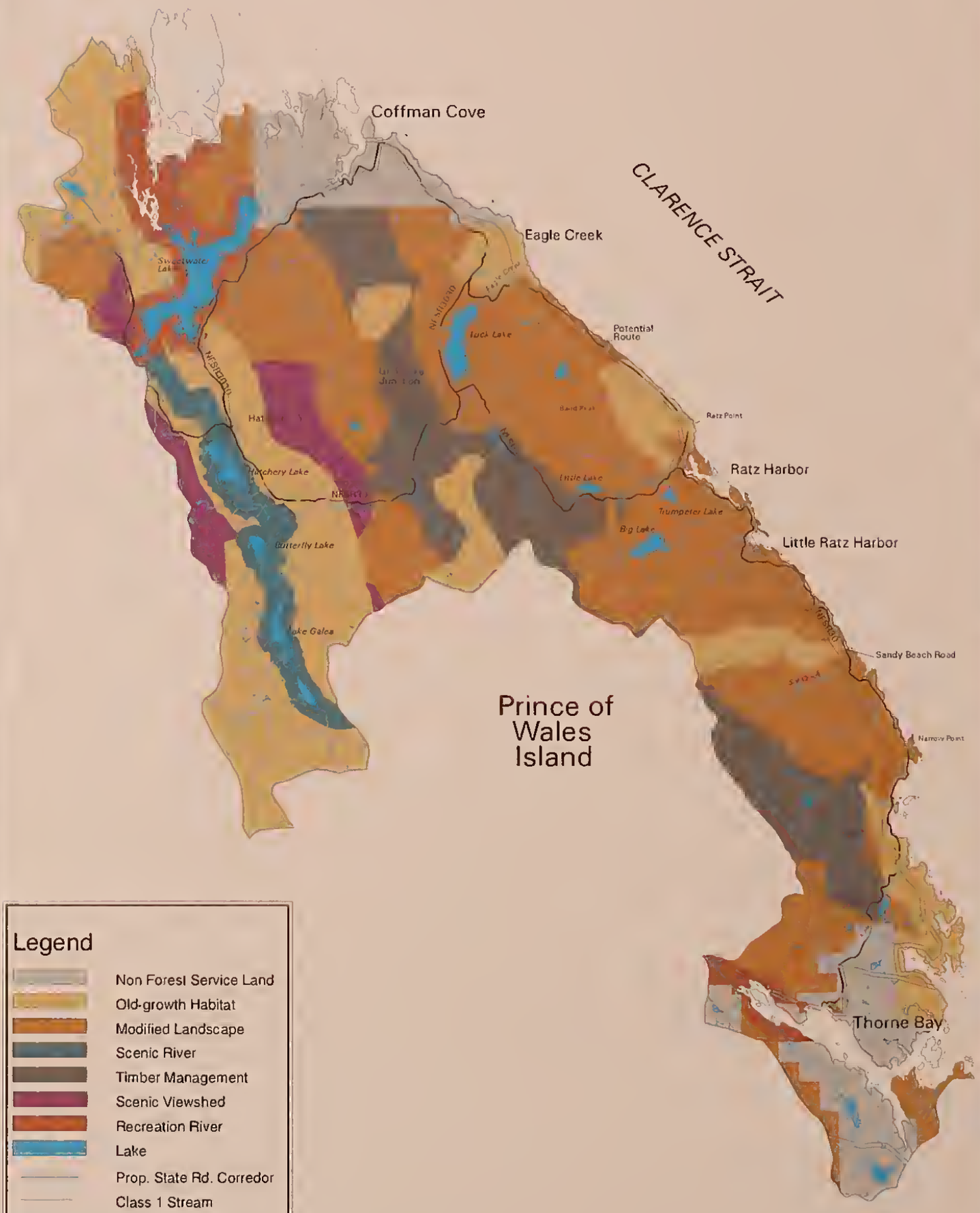
Sandy Beach Road Project
Land Use Designations



Legend

- Non Forest Service Land
- Old-growth Habitat
- Modified Landscape
- Scenic River
- Timber Management
- Scenic Viewshed
- Recreation River
- Lake
- Prop. State Rd. Corredor
- Class 1 Stream
- Class 2 Stream
- Class 3 Stream
- Class 4 Stream
- Roads
- Project Boundary

N

0 2.5 5

Miles

Figure 1-2

Data obtained from

Old-growth Habitat: Old-growth Habitat LUDs are scattered throughout the Project area. It is the goal of this LUD to maintain areas of old growth forest and associated natural ecological processes. Objectives include contributing to habitat capability of fish and wildlife resources to support sustainable human subsistence and recreational uses; and maintaining components of flora and fauna biodiversity and ecological processes associated with old-growth forests. In this LUD, roads, facilities, and permitted uses are to be limited to those compatible with old-growth forest habitat management objectives.

Scenic River: It is the goal of this LUD to manage designated river segments according to the Wild and Scenic Rivers Act guidelines, which strive to maintain, enhance, and protect the free-flowing character and outstandingly remarkable values.

Recreation River: The goal of this LUD, similar to that described above, is to manage designated river segments according to the Wild and Scenic Rivers Act guidelines. This LUD provides recreation opportunities in a pleasing, though modified, generally free-flowing river setting, while allowing timber harvest, transportation, and other developments. Areas visible from Visual Priority Routes in foreground, middleground, and background are to meet the Partial Retention Visual Quality Objective (VQO), while unseen areas are to meet the Modification VQO.

Scenic Viewshed: Several hillsides flanking the west side of the Thorne River/Hatchery Creek corridor are within the Scenic Viewshed LUD, as is a portion of the landscape seen north of NFSR 30 between the Luck Lake junction and the Hatchery-Y. This LUD is intended to provide a sustained yield of timber and a mix of resource activities, while minimizing the visibility of developments as seen from Visual Priority Travel Routes and Use Areas.

Modified Landscape: The Modified Landscape LUD includes land east and west of Sweetwater Lake, between the Thorne River/Hatchery Creek corridor and Luck Lake, the vicinity of Baird Peak and Big Lake, and along Slide Creek. The goal of this LUD is to provide a sustained yield of timber and a mix of resource activities while minimizing the visibility of developments in the foreground distance zone.

Timber Production: Portions of the Project area not described above are within the Timber Management LUD. This includes interior areas in the southeast part of the Project area (between Thorne Bay and Slide Creek) and areas immediately south of the Community of Coffman Cove. It is the goal of this LUD to maintain and promote industrial wood production from suitable timberlands, providing a supply of wood to meet society's needs.

Transportation and Utility System: This LUD extends along the shoreline through the Ratz inventoried roadless area from Thorne Bay To Coffman Cove, along the NFSR 3030 road alignment between Coffman Cove and the Hatchery "Y" and westward from the Hatchery "Y" along the NFSR 30 alignment. The goal of this designation is to provide for and/or facilitate the development of existing and future major public Transportation and Utility Systems, including those identified by the State of Alaska and the Alaska Energy Authority. During the period before actual construction of a new transportation

or utility system occurs, the management prescriptions of the initial LUDs underlying the corridors will remain applicable.

Table 1-1. Acreage of land within the project boundary, including National Forest System lands (by Land Use Designation) and state and private ownership.

Land Use Designation*	Acreage
Old-growth Habitat	36,274
Scenic River	6,082
Recreation River	8,426
Scenic Viewshed	6,031
Modified Landscape	55,623
Timber Production	20,034
Other Ownership	14,972
Total	147,442

* No acreage is provided for the TUS LUD because the width is undefined. The TUS LUD boundary shown on Figure 1-2 is approximate.

Desired Future Condition

The desired future conditions described for the Forest Plan LUDs, in conjunction with the other Forest Plan direction outlined above, provide the parameters for identifying and defining project-specific desired future conditions. The following desired future conditions will help guide management of the project to ensure consistency with the Forest Plan.

Old-growth Habitat: The desired future condition is that all forested areas attain old-growth forest characteristics and provide a diversity of old-growth habitat types, associated species, and ecological processes.

Semi-Remote Recreation: The desired future condition is characterized by generally unmodified natural environments. Ecological processes and natural conditions are only minimally affected by past or current human uses or activities. Interactions between users are infrequent.

Scenic River: For this LUD, the desired condition is for the outstandingly remarkable values for which the river was designated to remain outstanding and remarkable. Ecological processes and changes may be somewhat affected by human use, but resource activities within the river corridor are not visually evident to the casual observer. Facilities and structures are rustic in appearance, and promote semi-primitive recreation experiences and/or public safety.

Recreation Rivers: The desired condition for Recreation Rivers is similar to Scenic Rivers. Ecological processes and changes may be affected by human uses. Recreation users have the opportunity for a variety and range of experiences in a modified but pleasing setting.

Scenic Viewshed: The desired future condition emphasizes a natural-appearing landscape as viewed by users of visual priority travel routes and use areas. Recreation and tourism opportunities in a range of settings are available. A variety of successional stages providing wildlife habitat occur, although late successional stages predominate.

Modified Landscape: The desired future condition accepts a somewhat modified landscape, but emphasizes scenic quality in foreground distance zones. Recreation opportunities associated with natural-appearing to modified settings are available. A variety of successional stages provide a range of wildlife habitat conditions.

Timber Production: The desired future condition includes a sustained yield of timber, healthy tree stands in a balanced mix of age classes from young stands to trees of harvestable age, and a road system providing access for timber management as well as recreation, hunting and fishing, and other public uses. Recreation opportunities associated with roaded settings are available. Wildlife habitats are predominantly in the early and middle successional stages.

Transportation and Utility System: The desired future condition is that systems have been designed to be compatible with the adjacent LUD to the maximum extent feasible. Effects on other resources have been recognized and resource protection has been provided.

PURPOSE AND NEED

The purpose of the Sandy Beach Road Reconstruction project is to increase safety, user convenience, travel service, and provide roadside enhancements between Thorne Bay and Coffman Cove for all users of the road. The Forest Service is authorized by the Forest Highway Program to assume a role as manager of roads for passenger car traffic. Under the Public Forest Service Road (PFSR) program the Forest service operates and maintains roads that provide key links to forest lands and sites for forest products traffic, give access to emerging communities, and add additional opportunities for recreation and tourism. It is a cooperative effort between the surrounding communities, Forest Service, Alaska Department of Transportation and Public Facilities, and the Federal Highway Administration and the Forest Highway program. The thrust of the program is to provide forest users access into and through the National Forest. The need for this project is based primarily on existing road and traffic conditions, the lack of roadside enhancements, and the projected increased traffic using the road following establishment of the Inter-Island Ferry system. This project will also support economic development opportunities throughout northern Prince of Wales Island. This project is consistent with the goals and objectives of the Tongass Forest Plan to:

1. Develop and manage roads and utility systems to support resource management activities; recognize the potential for future development of major Transportation and Utility Systems.

2. Provide access to and through the forest for all users.

3. Manage and maintain roads to protect water, soil, fish and wildlife resources.

4. Provide a diversity of opportunities for resource uses that contribute to the local and regional economies of Southeast Alaska.

5. Provide a range of recreation opportunities consistent with public demand, emphasizing locally popular recreation places and those important to the tourism industry.

PROPOSED ACTION

A "proposed action" is defined early in the project-level planning process. This serves as a starting point for the interdisciplinary team, and gives the public and other agencies specific information on which to focus comments. Using these comments (see discussion of issues later in this chapter) and information from preliminary analysis, the interdisciplinary team then develops alternatives to the proposed action. These are discussed in detail in Chapter 2.

The Forest Service proposes to reconstruct existing single lane roads between Thorne Bay and Coffman Cove to allow vehicles to pass safely in two directions, by constructing inter-visible turn-outs or by widening the roads to two lanes. The additional width will accommodate a range of vehicles, and drivers who are not familiar with safe driving practices for single lane roads. Bridges and culverts will be designed to improve fish passage.

As part of this project, the Forest Service also proposes to enhance recreation facilities. Sites already targeted for improvement include beach access points along the Sandy Beach Road, construction of a boat ramp at Ratz Harbor and/or Little Ratz Harbor, a campground with potable water and sanitary facilities near Ratz Harbor or Little Ratz Harbor, overlooks to provide views of the Clarence Strait, and rehabilitation of the Luck Lake Access and Picnic Area. The proposed project will provide views of the scenery and improved access to recreational facilities along the east coast of Prince of Wales Island for travelers.

TIMEFRAMES

The Decision Notice will be signed approximately 30 days after the close of the 30-day notice and public comment period.

DECISIONS TO BE MADE

Based on the environmental analysis in this EA, the District Ranger will decide whether and how to construct, reconstruct, realign or otherwise improve road conditions between the communities of Coffman Cove and Thorne Bay, in accordance with Forest Plan goals, objectives and desired future conditions. This decision will include:

- The location, design and scheduling of road construction activities;
- Details of a road and culvert maintenance program based on road-conditions surveys conducted in the Project Area;
- Mitigation measures and monitoring requirements; and

- Whether there may be a significant restriction on subsistence uses, and if so, related findings and measures to minimize impacts on subsistence users.

PUBLIC INVOLVEMENT

The Council on Environmental Quality (CEQ) defines scoping as "...an early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to a proposed action" (40 CFR 1501.7). Among other things, the scoping process is used to invite public participation, to help identify public issues, and to obtain public comment at various stages of the EA process. Although scoping is to begin early, it is really an iterative process that continues until a decision is made. In addition to the following specific activities, the Sandy Beach project has been listed on the Tongass National Forest Schedule of Proposed Actions since January 4, 2001, available on the Internet.

To date, the public has been invited to participate in the project in the following ways:

Public Mailing

In January, 2001, a letter providing information and seeking public comment was mailed to approximately 350 individuals and groups that had previously shown interest in Forest Service projects in Southeast Alaska. This included federal and state agencies, Alaska Native groups, municipal offices, businesses, interest groups, and individuals.

Local News Media

Announcements about the project were printed in the *Island News* and *Ketchikan Daily News*.

Public Meetings

Public meetings were held in Thorne Bay on February 13, 2001 and in Coffman Cove on February 14, 2001. The meetings were held to provide project area information, present the proposed action, and discuss local concerns and interests that should be addressed in the Sandy Beach project analysis. The Forest Service has also coordinated this project with the Prince of Wales Community Advisory Council (POWCAC) for the last two years. It has been identified in one of their resolutions as a priority for the last two years.

Issues

Most of the significant issues for the Sandy Beach project were identified through the public involvement activities. Eight people participated in the public scoping meetings, and a total of ten written comment letters were received from agencies and individuals. Internal scoping was also important in defining key issues. Similar issues were combined into one statement where appropriate. The following eight issues were determined to be significant and within the scope of the project decision. These issues are addressed through the proposed action and alternatives.

Issue 1: Improve safety and convenience (including "quality of ride") of travel in the project area.
Under current conditions, two vehicles traveling in opposite directions on roads in the Project Area pass with difficulty; one vehicle must turn toward the ditch or toward a cut bank. This practice is difficult for any vehicle, and the difficulty increases when the vehicles are large (trucks, RVs) or when drivers are unaccustomed to this convention. This issue relates to the need to improve vertical and horizontal alignments, increase sight-distances, and provide a more convenient and more easily maintained roadway.

Issue 2: Provide year-round, all-weather access between Coffman Cove and Thorne Bay via a shorter, more direct route.
This issue relates to providing a direct route between Coffman Cove and Thorne Bay that can be used during the winter. The only route that is currently passable during the winter is the 47-mile route via the 20 Road.

Issue 3: Meet increased demand expected to result from new ferry terminal.
The Alaska Marine Highway ferry terminal in Hollis serves as the current vehicular entryway to Prince of Wales Island in general and to the Project area in particular. A second Prince of Wales Island ferry terminal has been proposed at Coffman Cove. Construction of such a ferry terminal would bring many Prince of Wales Island residents and visitors to Coffman Cove and significantly increase the volume of traffic on the Sandy Beach Road and other roads within the Project area.

Issue 4: Improve access to existing recreation facilities and increase recreation opportunities.
Tourism in southeast Alaska, including Prince of Wales, is increasing. The primary visitors to the island are sportfishing enthusiasts and independent recreationists (McDowell Group 1996, in USDOT 2000). Currently, tourism within the Project area is limited by the remote location, limited access, and lack of supporting infrastructure.

Issue 5: Provide, maintain or improve fish passage at all crossings.
A recent road condition survey conducted by the Forest Service indicated that numerous culverts in the Project Area are functioning as barriers to fish passage, rather than allowing unimpeded movement. Migration is essential for many fish species in the Tongass National Forest. Anadromous fish (fish that migrate from the ocean to freshwater to spawn) require access to spawning habitat. Juvenile anadromous fish migrate during their freshwater life stage, seeking seasonal habitats. Resident fish (fish that spend their entire life in freshwater) also may migrate seasonally in response to food, shelter, and spawning needs.

Issue 6: Reduce sediment contribution into streams to protect water quality.
Although road construction clearly presents a risk to water quality, the risk is temporary; occasional road repairs, regular maintenance, and long-term use often pose an even greater risk. Gravel-surfaced forest roads that cross streams and rivers can affect fish habitat through the introduction of coarse and fine sediments during grading of bridges. Gravel surfaces can also introduce fine sediment over time, as

rock flour and airborne dust are deposited in waterways. Both gravel and paved surfaces may serve to route sediment-laden water into streams during periods of precipitation or snowmelt.

Issue 7: Protect natural resource values in the roadless area.
The Ratz roadless area contains high quality habitat for wildlife and other natural resources. Specific concerns related to this issue include the effects of new road access on deer and subsistence.

Issue 8: Consideration of regulatory setting and requirements, balanced use, funding mechanisms and effects on project schedule associated with entry into the roadless area.
This issue relates to factors other than environmental concerns that would affect the feasibility of construction in a roadless area. These include the uncertain status of the Roadless Area Conservation Rule; whether a project involving entry into a roadless area would be eligible for funding under the Forest Service's anticipated PFSR authority; and delays that would be caused by the need for additional environmental analysis.

PLANNING RECORD

The planning record includes documentation of public involvement activities, Forest Service guidance regarding the project, and Forest GIS data. The planning record is located at the Thorne Bay Ranger District office in Thorne Bay, Alaska, and is available upon issuance of the final EA. Reference documents, such as the Forest Plan, are available at public libraries around the region, as well as at the Supervisor's Offices in Ketchikan. The Forest Plan is also available on the internet at http://www.fs.fed.us/r10/tongass/, and CD-ROM.

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Chapter 2
Alternatives

INTRODUCTION

Chapter 2 describes a no action alternative and four action alternatives the Forest Service will consider for the Sandy Beach Road Project, and explains how they were developed. It also compares the alternatives in terms of their effects on each of the key issues, in order to provide a clear basis for choice among the alternatives by the decision maker and the public. More detailed information about the effects of the alternatives on the issues, and other environmental considerations, is provided in Chapter 3.

OVERVIEW

As part of the discussion of alternatives, the following sections describe specific road design elements and standards that must be taken into consideration as part of planning and implementation for any of the alternatives. This information serves as the basis for understanding the construction activities that would be associated with the proposed action, in order to evaluate their potential effects on the environment.

ALTERNATIVE DEVELOPMENT PROCESS

Each of the action alternatives described below is designed to meet the purpose and need for the project (as described in Chapter 1), while emphasizing different resource values. The interdisciplinary (ID) team based the development of the alternatives on a review of Forest-wide planning documents; plans developed specifically for the Thorne Bay Ranger District; natural resource data compiled in the Forest GIS and in other recent environmental documents; comments provided during the scoping process; and a field visit to the project area to examine existing road conditions.

Alternatives Considered but Eliminated from Detailed Study

No alternatives, other than those described below, were proposed or considered.

Items Common to All Alternatives

The action alternatives have several items in common. Road design elements and standards that must be considered under any action alternative are described below. Certain recreation enhancement measures are also proposed under any alternative, and are described in the following section. Mitigation measures and monitoring activities are also items common to all alternatives; these are listed at the end of the chapter.

Design Elements and Standards

Due to anticipated low average daily traffic (ADT) values and use of the road by heavy logging equipment, road construction equipment, and multi-use passenger vehicles; high-speed, high volume highway design standards are not appropriate for this project. The road is intended to function similar to a county road and not as a high-speed state highway. Consequently, the road will be designed as a minor rural collector and meet

AASHTO standards discussed on page 459-470 of 'A Policy of Geometric Design of Highways and Streets', AASHTO 1994 .

Design Elements

AASHTO classifies design elements into five major categories: sight distance, horizontal alignment, vertical alignment, combination of horizontal and vertical alignment, and other elements affecting design. Design standards describe the physical characteristics (e.g., road running surface width, cut slope, fill slope, and road surface type) needed to meet the objectives of each design element. To simplify the application of design elements to road design and construction procedures, this discussion relates these elements to the desired design speed for proposed road segments.

Sight distance: Sight distance is the length of roadway ahead visible to the vehicle operator. At a minimum, this distance should be sufficiently long to enable a vehicle traveling at or near the design speed to stop before reaching a stationary object in its path. For Minor Rural Collector Roads AASHTO recommends that sight distance at every point along the roadway be at least that required for the below-average driver or vehicle to stop within this distance. It is anticipated that sight distance will play a major role in the design and re-construction/construction of the Sandy Beach Road, e.g., design speeds, levels of excavation and safety requirements.

Horizontal alignment is the term that describes the influence of road curvature on travel (design) speed and sight distance. Of specific concern on the Minor Rural Collector Road is the ability to maintain stopping sight distance across horizontal curves. Sight obstacles such as road cut banks and vegetation commonly reduce sight distance below minimum stopping distances for given design speeds. Minimizing this effect on Minor Rural Collector Roads often involves increasing road right-of-way clearing or cut bank excavation to meet minimum sight distance requirements.

Vertical alignment is the term that describes the combination of road grade, changes in these grades, and associated vertical curves on a given road segment. This element can have major influence on many aspects of a road project. Not only does vertical alignment affect sight distance and design speed, but it can also have significant influence on aspects such as drainage and surface erosion, and therefore maintenance costs. When road grades are in excess of 15 percent favorable and 11 percent adverse, vertical alignment tends to be the design element that governs design speed.

Of further concern is the influence of vertical alignment on road surface material. Steep road grades may require that the designer pay special attention to the type of surfacing used to maintain road integrity and minimize maintenance costs through surface erosion.

Combination of Horizontal and Vertical Alignment: This design element combines the effects of both horizontal and vertical alignment. Effects of this design element are most profoundly shown in sight distance. Road design that does not adequately take this element into account can result in a disjointed sight effect. This occurs when a driver approaches the crest of a vertical curve, and viewing over the crest, sees a horizontal curve on the other side of the vertical curve before seeing the road directly beyond the

crest of the vertical curve. Not only does this significantly reduce sight distance, but it also can pose a significant safety issue. On-coming vehicles can be nearly unseen on a disjointed curve situation.

Proper design procedures that address the combination of horizontal and vertical alignment are essential to the success of a road project. Correcting road segments with disjointed sight effect can be very difficult and costly. Due to relatively steep slopes and dissected terrain along various segments of the proposed Sandy Beach Road route(s), disjointed sight effect will likely play a major role in design and construction.

Other Elements Affecting Design and Construction: These elements include drainage, erosion control and landscape development, signing and marking, and maintenance of traffic through construction areas. They tend to have much less impact on road geometry and more on overall road cost. Of these, it is anticipated that drainage and erosion control will result in the greatest cost impact on the Sandy Beach Road project. Implementation of Forest Standards and Guidelines, BMPs and other mitigation measures needed to provide fish passage and protect water quality will result in design and construction practices that are significantly more costly than those that were originally employed during construction of existing roads.

Design Standards

Four design scenarios were considered for construction / reconstruction of proposed Sandy Beach Road routes. These scenarios and associated design standards include 1) one-lane road with turn-outs and aggregate surface; 2) one-lane road with turn-outs and asphalt-paved surface; 3) two-lane road with aggregate surface; and 4) two-lane road with asphalt-paved surface. Application of these scenarios, or treatments, to each road segment within the project area is described under each alternative, summarized in Table 2-1, and discussed in more detail in Appendix A.

Lane Width: Selection of a one-lane or two-lane design standard for a particular segment would affect the level of construction effort required, the extent of clearing and ground disturbance, and the number of drainage structures that would need to be replaced. A preliminary engineering analysis of the level of effort (low, medium, high) needed to construct each segment of road to achieve safe sight distances and acceptable horizontal and vertical alignment is described in Appendix A (Transportation Engineering Report). This analysis takes into account factors such as underlying geology, soils, slopes, horizontal and vertical controls, streams and wetlands that would need to be addressed in each segment of road under each alternative.

Drainage Structures: For segments of one-lane construction, only those drainage structures identified for replacement due to fish passage concerns, or those reaching the end of their service life, would be replaced. For segments of two-lane construction, all drainage structures, with the exception of certain bridges, would be replaced, since extending existing structures to match a two-lane road width would likely be infeasible and/or cost prohibitive. All culverts and bridges installed in the reconstruction will be designed for fish passage.

Road Surfacing: Two surfacing options, crushed aggregate rock and hot mix asphalt concrete, were considered for use in all reconstruction / construction scenarios. There is little effective difference in the design speeds of asphalt and packed aggregate surfaced roads for any given alignment. Although design speed changes for differing weather conditions (wet or dry surface), the effect of the different surfacing materials does not. The primary differences between aggregate and asphalt are related to initial costs, maintenance costs, and environmental considerations.

The lower initial cost of aggregate surfacing is somewhat offset by the ongoing maintenance costs incurred through grading and periodic resurfacing as aggregate breaks down or is lost. Aggregate can be manufactured close to the job site using a portable rock crusher with rock obtained from pits located adjacent to the existing road system.

Although initial costs are higher, asphalt surfacing has several advantages over aggregate surfacing. A smoothed travel way, with painted centerlines and fog lines, enhances safety and the quality of ride for vehicle occupants. An asphalt surface requires less maintenance than an aggregate surface, and is more resilient to the effects of snowplows during snow removal operations. A portable plant would be required to produce asphalt if a permanent plant is not located locally.

Recreation Enhancements

Each action alternative includes recreation enhancements to improve beach access, rehabilitation/construction of trail heads to beaches along Clarence Strait, day use areas at Ratz Harbor and Little Ratz Harbor; construction of a campground with potable water and sanitary facilities near Ratz Harbor, overlooks to provide views of the Clarence Strait, and rehabilitation of the Luck Lake Access and Picnic Area. The type and location of additional recreation enhancements varies between alternatives, corresponding to the location of road segments targeted for improvement under each alternative.

Alternatives Considered in Detail

After identifying the key issues for the project, the ID team divided the existing roads and the potential route from Ratz Harbor to Eagle Creek into segments and considered several treatment options for each segment, as described above. Each action alternative includes the existing Sandy Beach Road from Thorne Bay to Ratz Harbor. This segment of road is considered the common route, although alternatives vary in the design standards (width, surfacing) that would be applied to it.

Treatment options for each segment within each alternative were selected based on several factors associated with the key issues. These included consideration of population centers, recreation sites, and traffic volumes; types of current and expected use (e.g., recreation, local, or hauling); junctions between higher-use and lower-use segments; effects on natural resources, including fish, water quality, wetlands and wildlife; maintaining the forest-road experience in some segments; and providing a suitable surface for snow-removal efforts if desired by the municipalities. Treatment options, or design scenarios, are summarized in Table 2-1.

Alternative 1

NEPA requires analysis of a no action alternative. Under the no action alternative, existing road segments would not be improved and no new road segments would be constructed. Concerns about convenience and safety would likely increase, and RV traffic to and from the ferry terminal planned for construction at Coffman Cove would likely add to these concerns. Winter travel between Coffman Cove and Thorne Bay would still require use of the more circuitous route via the existing 20 Road. Existing culvert barriers would continue to block fish passage at some stream crossings. As gravel is crushed over time, sediment from unpaved road surfaces and bridges would continue to have the potential to enter streams. Figure 2-1 shows the existing road network under the no action alternative.

Alternative 2

This alternative proposes improvement of existing roads; no new road segments would be constructed. Under Alternative 2, the common route and segments from Ratz Harbor to the Luck Lake Junction and from Luck Lake Junction to the Hatchery Y would be upgraded to paved, two-lane road. This alternative would link with the Coffman Cove Road, which is scheduled to be upgraded to paved, two-lane road. Figure 2-2 shows the lane width and surfacing proposed for each road segment under Alternative 2.

This alternative would not provide the most direct route between Thorne Bay and Coffman Cove, but it would increase speed, safety and convenience of travel between the communities over existing conditions. The road segment between Ratz Harbor and the Luck Lake Junction traverses a high-elevation pass and is typically closed during the winter, due to heavy snow accumulations. Paving of this segment would provide a surface suitable for plowing, which would allow year-round travel between the communities, if either or both communities chose to undertake this maintenance. This alternative would provide a general-purpose road, well-located for haul traffic.

Alternative 3

This alternative proposes improvement of existing roads; no new road segments would be constructed. Under this alternative, the common route and the segment from Ratz Harbor to the Luck Lake Junction would be upgraded to paved, two-lane road. The segments from the Luck Lake Junction to Eagle Creek and from Eagle Creek to Coffman Cove would be upgraded to paved one-lane road with inter-visible turn-outs. Figure 2-3 shows the width and surfacing proposed for each road segment under Alternative 3.

This alternative would provide a more direct route than Alternative 2 between Thorne Bay and Coffman Cove to improve service, convenience and safety of travel between the towns. Paving the segment between Ratz Harbor and the Luck Lake Junction would provide a surface suitable for snow removal during the winter, and if plowed, would be passable year-round.

Alternative 3 would tend to direct traffic (recreational and industrial) through semi-residential areas of Coffman Cove. Elements of the forest-road experience between Coffman Cove and the Luck Lake Junction would be retained.

Alternative 4

This alternative proposes improvement of existing roads; no new road segments would be constructed. Under Alternative 4, the common route and the segment between Eagle Creek and Coffman Cove would be upgraded to paved two-lane road. The segments from Ratz Harbor to the Luck Lake Junction and from Luck Lake Junction to Eagle Creek would be upgraded to gravel one-lane road with inter-visible turn-outs. Figure 2-4 shows the width and surfacing proposed for each road segment under Alternative 4.

Like Alternative 3, this alternative also provides a more direct route between Thorne Bay and Coffman Cove than Alternative 2, and also upgrades road conditions at both ends of the project area to improve convenience, safety and recreation access near the two communities. This alternative assumes that upgrades to the higher road standard (paved two-lane) would be limited to the segments nearest the two communities, since they receive the highest use and widest mix of users, and limits upgrades in the remaining segments to gravel one-lane with inter-visible turn-outs. This alternative would not provide a surface compatible with snow removal, and would not be passable year-round. Alternative 4 would allow for phased development, because it would not commit resources to high-standard roads at this time that would be unnecessary if a low-elevation route is constructed between Coffman Cove and Thorne Bay via the Ratz (Baird Peak) roadless area in the future.

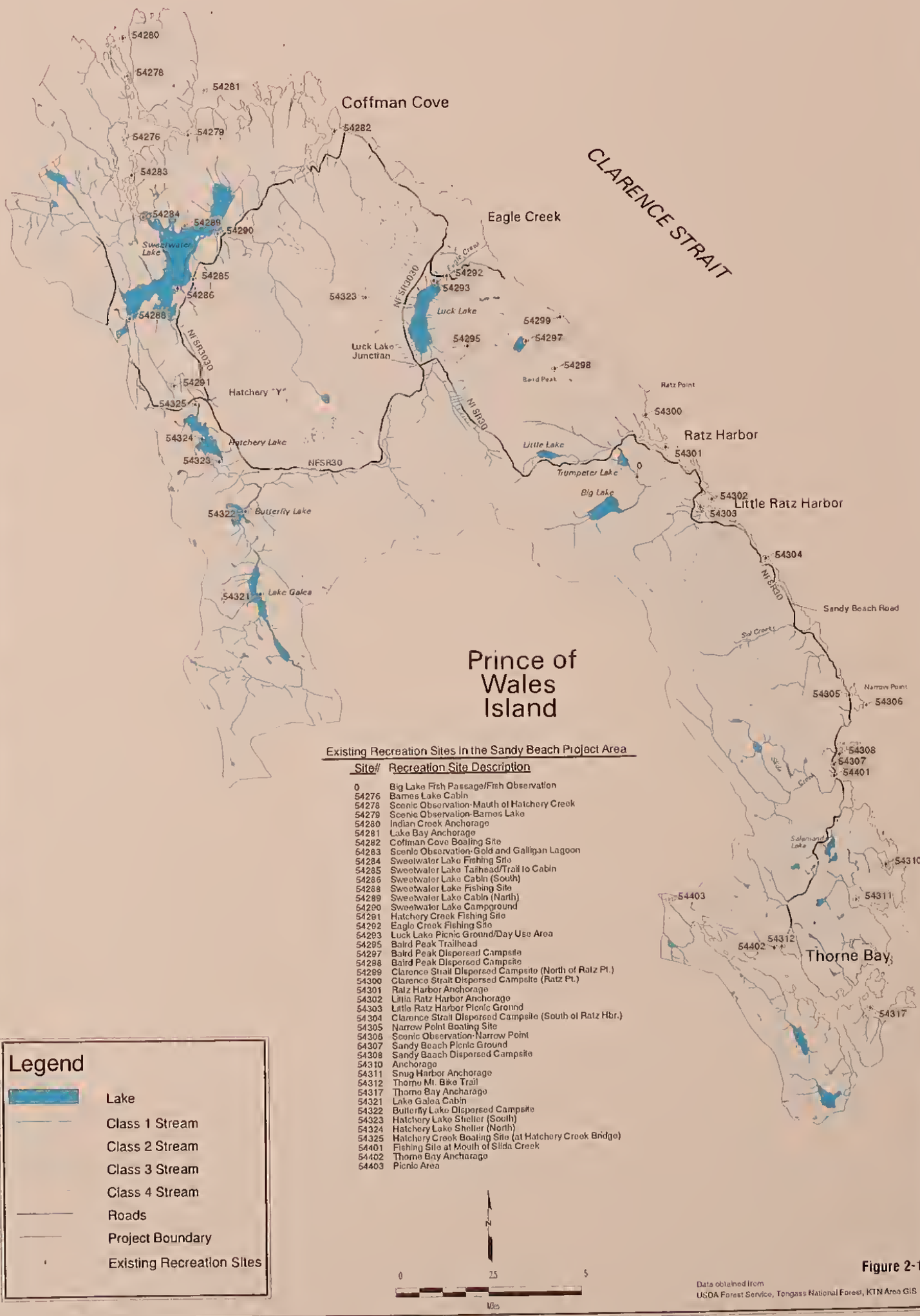
A minor modification to this alternative would be to treat shorter sections of the route by upgrading to paved, two-lane road, i.e., from Thorne Bay to the Sandy Beach Picnic Area and from the boundary of State land to the City of Coffman Cove. The remaining segments of the route between the communities (via Luck Lake and Eagle Creek) would be upgraded to gravel two-lane road, rather than one-lane. This modification would reduce costs, as shown in Table 2-3, but would not have significantly different environmental effects than Alternative 4 and for this reason, was not analyzed as a separate alternative.

Alternative 5

This alternative proposes improvement of existing roads and construction of a new road segment. The new road segment would link existing roads via a low-elevation route through the Ratz inventoried roadless area. Under Alternative 5, the common route and the segment from Eagle Creek to Coffman Cove would be upgraded to a gravel two-lane road. The new low-elevation road segment would be constructed as a gravel one-lane road with inter-visible turn-outs. The existing road segment from the 3030100 Road to Eagle Creek would be upgraded to the same standard. Figure 2-5 shows the width and surfacing proposed for each road segment under Alternative 5.

Sandy Beach Road Project

No Action Alternative



Existing Recreation Sites in the Sandy Beach Project Area

Site#	Recreation Site Description
0	Big Lake Fish Passage/Fish Observation
54276	Barnes Lake Cabin
54278	Scenic Observation-Mouth of Hatchery Creek
54279	Scenic Observation-Barnes Lake
54280	Indian Creek Anchorage
54281	Lake Bay Anchorage
54282	Coffman Cove Boating Site
54283	Scenic Observation-Gold and Galligan Lagoon
54284	Sweetwater Lake Fishing Site
54285	Sweetwater Lake Trailhead/Trail to Cabin
54286	Sweetwater Lake Cabin (South)
54288	Sweetwater Lake Fishing Site
54289	Sweetwater Lake Cabin (North)
54290	Sweetwater Lake Campground
54291	Hatchery Creek Fishing Site
54292	Eagle Creek Fishing Site
54293	Luck Lake Picnic Ground/Day Use Area
54295	Baird Peak Trailhead
54297	Baird Peak Dispersed Campsite
54298	Baird Peak Dispersed Campsite
54299	Clarence Strait Dispersed Campsite (North of Ratz Pt.)
54300	Clarence Strait Dispersed Campsite (Ratz Pt.)
54301	Ratz Harbor Anchorage
54302	Little Ratz Harbor Anchorage
54303	Little Ratz Harbor Picnic Ground
54304	Clarence Strait Dispersed Campsite (South of Ratz Hbr.)
54305	Narrow Point Boating Site
54306	Scenic Observation-Narrow Point
54307	Sandy Beach Picnic Ground
54308	Sandy Beach Dispersed Campsite
54310	Anchorage
54311	Snug Harbor Anchorage
54312	Thorne Mt. Bike Trail
54317	Thorne Bay Anchorage
54321	Lake Galea Cabin
54322	Butterfly Lake Dispersed Campsite
54323	Hatchery Lake Shelter (South)
54324	Hatchery Lake Shelter (North)
54325	Hatchery Creek Boating Site (at Hatchery Creek Bridge)
54401	Fishing Site at Mouth of Slide Creek
54402	Thorne Bay Anchorage
54403	Picnic Area

Legend

- Lake
- Class 1 Stream
- Class 2 Stream
- Class 3 Stream
- Class 4 Stream
- Roads
- Project Boundary
- Existing Recreation Sites

N

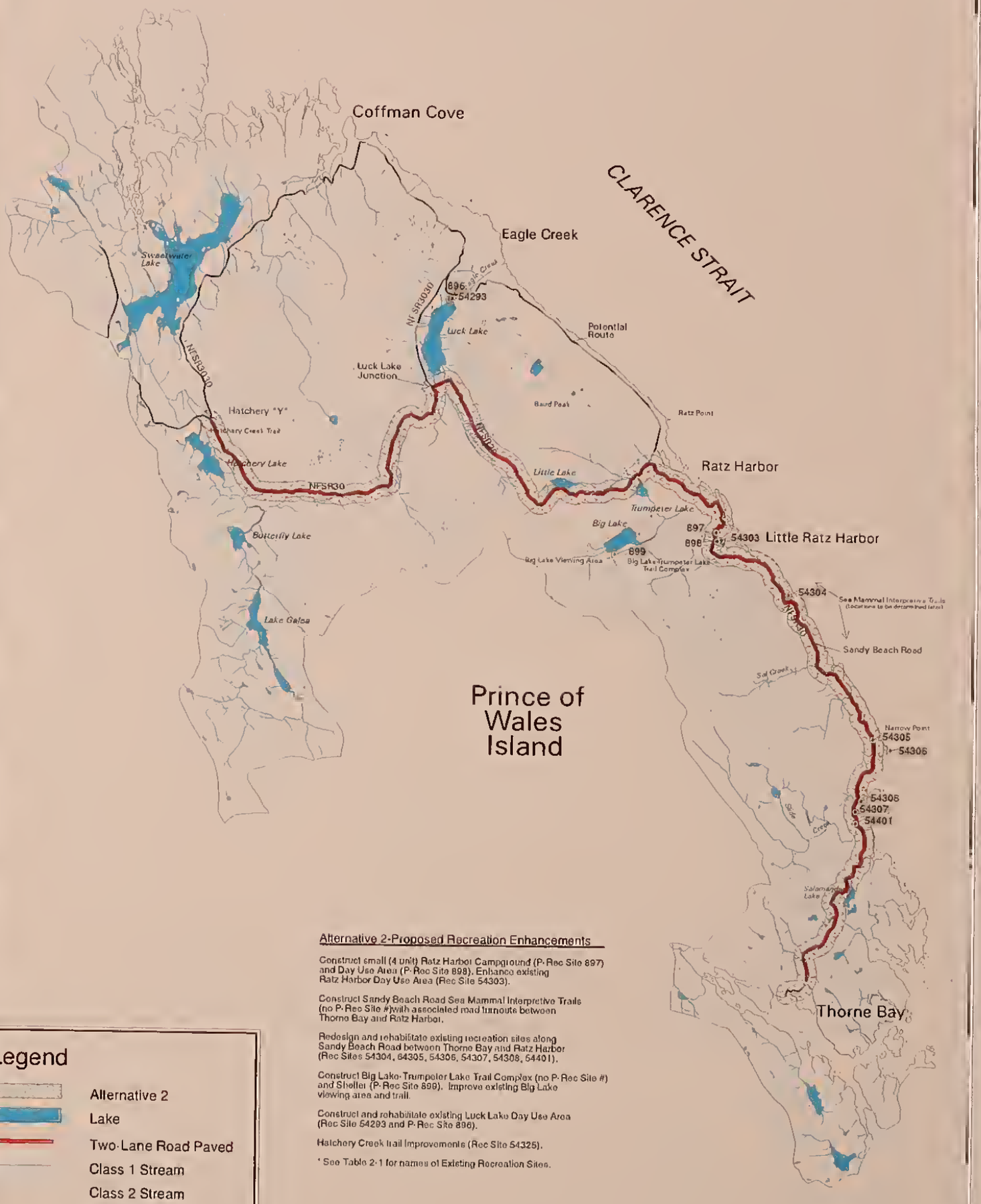
0 2.5 5

Miles

Figure 2-1

Data obtained from
USDA Forest Service, Tongass National Forest, KTN Area GIS

Sandy Beach Road Project
Alternative 2



Alternative 2-Proposed Recreation Enhancements

Construct small (4 unit) Ratz Harbor Campground (P-Rec Site 897) and Day Use Area (P-Rec Site 898). Enhance existing Ratz Harbor Day Use Area (Rec Site 54303).

Construct Sandy Beach Road Sea Mammal Interpretive Trails (no P-Rec Site #)with associated road turnouts between Thorne Bay and Ratz Harbor.

Redesign and rehabilitate existing recreation sites along Sandy Beach Road between Thorne Bay and Ratz Harbor (Rec Sites 54304, 54305, 54306, 54307, 54308, 54401).

Construct Big Lake-Trumpeter Lake Trail Complex (no P-Rec Site #) and Shelter (P-Rec Site 899). Improve existing Big Lake viewing area and trail.

Construct and rehabilitate existing Luck Lake Day Use Area (Rec Site 54293 and P-Rec Site 896).

Hatchery Creek trail improvements (Rec Site 54325).

* See Table 2-1 for names of Existing Recreation Sites.

Legend

- Alternative 2
- Lake
- Two-Lane Road Paved
- Class 1 Stream
- Class 2 Stream
- Class 3 Stream
- Class 4 Stream
- Roads
- Project Boundary
- Recreation Site

N

0 2.5 5

Miles

Figure 2-2

Data obtained from
USDA Forest Service, Tongass National Forest, KTN Area GIS

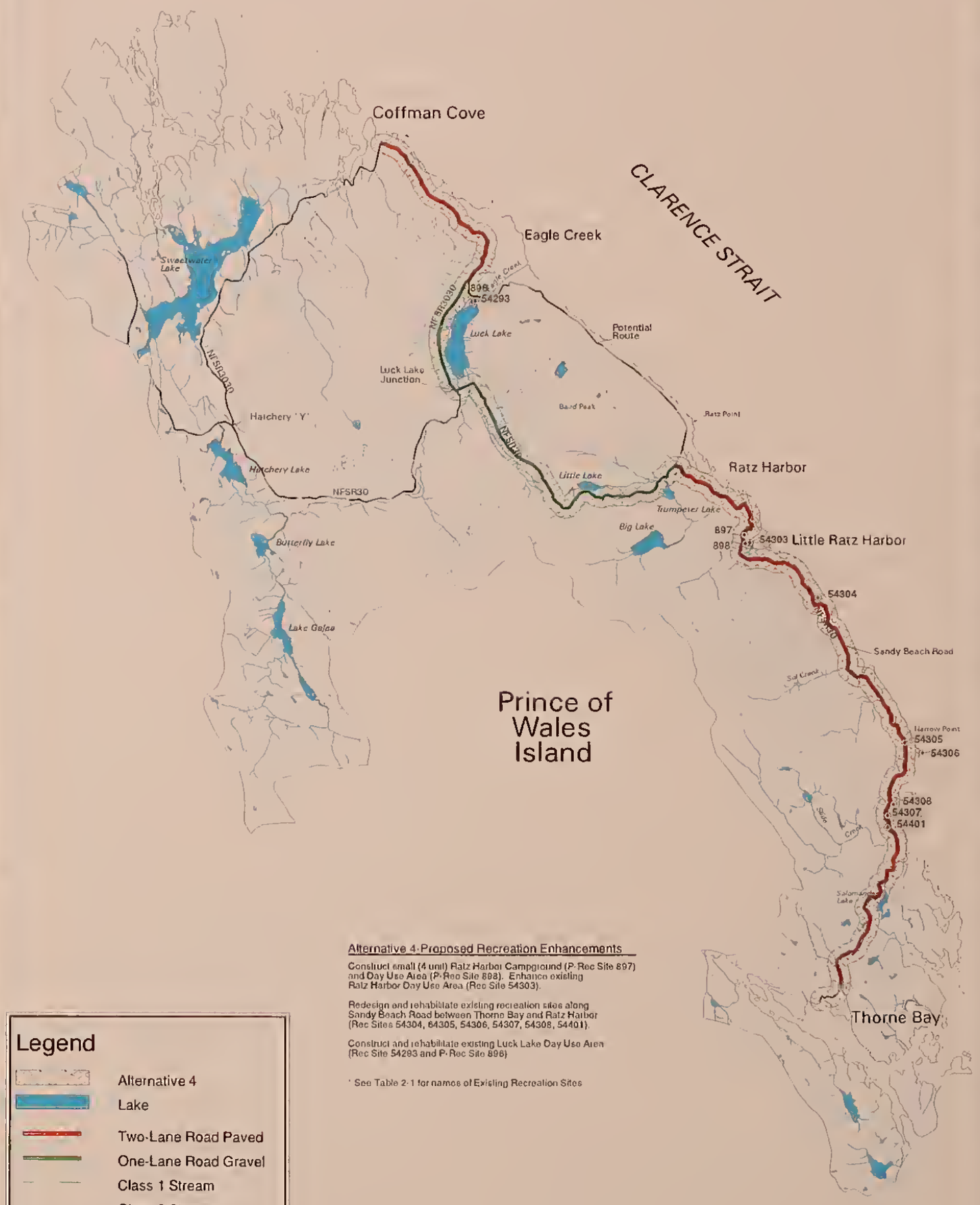
Sandy Beach Road Project
Alternative 3

Figure 2-3

Data obtained from
USDA Forest Service, Tongass National Forest, KTN Area GIS

Sandy Beach Road Project

Alternative 4



Alternative 4-Proposed Recreation Enhancements

Construct small (4 unit) Ratz Harbor Campground (P-Rec Site 897) and Day Use Area (P-Rec Site 898). Enhance existing Ratz Harbor Day Use Area (Rec Site 54303).

Redesign and rehabilitate existing recreation sites along Sandy Beach Road between Thorne Bay and Ratz Harbor (Rec Sites 54304, 64305, 54306, 54307, 54308, 54401).

Construct and rehabilitate existing Luck Lake Day Use Area (Rec Site 54293 and P-Rec Site 898)

* See Table 2-1 for names of Existing Recreation Sites

Legend

- Alternative 4
- Lake
- Two-Lane Road Paved
- One-Lane Road Gravel
- Class 1 Stream
- Class 2 Stream
- Class 3 Stream
- Class 4 Stream
- Roads
- Project Boundary
- Recreation Site

N

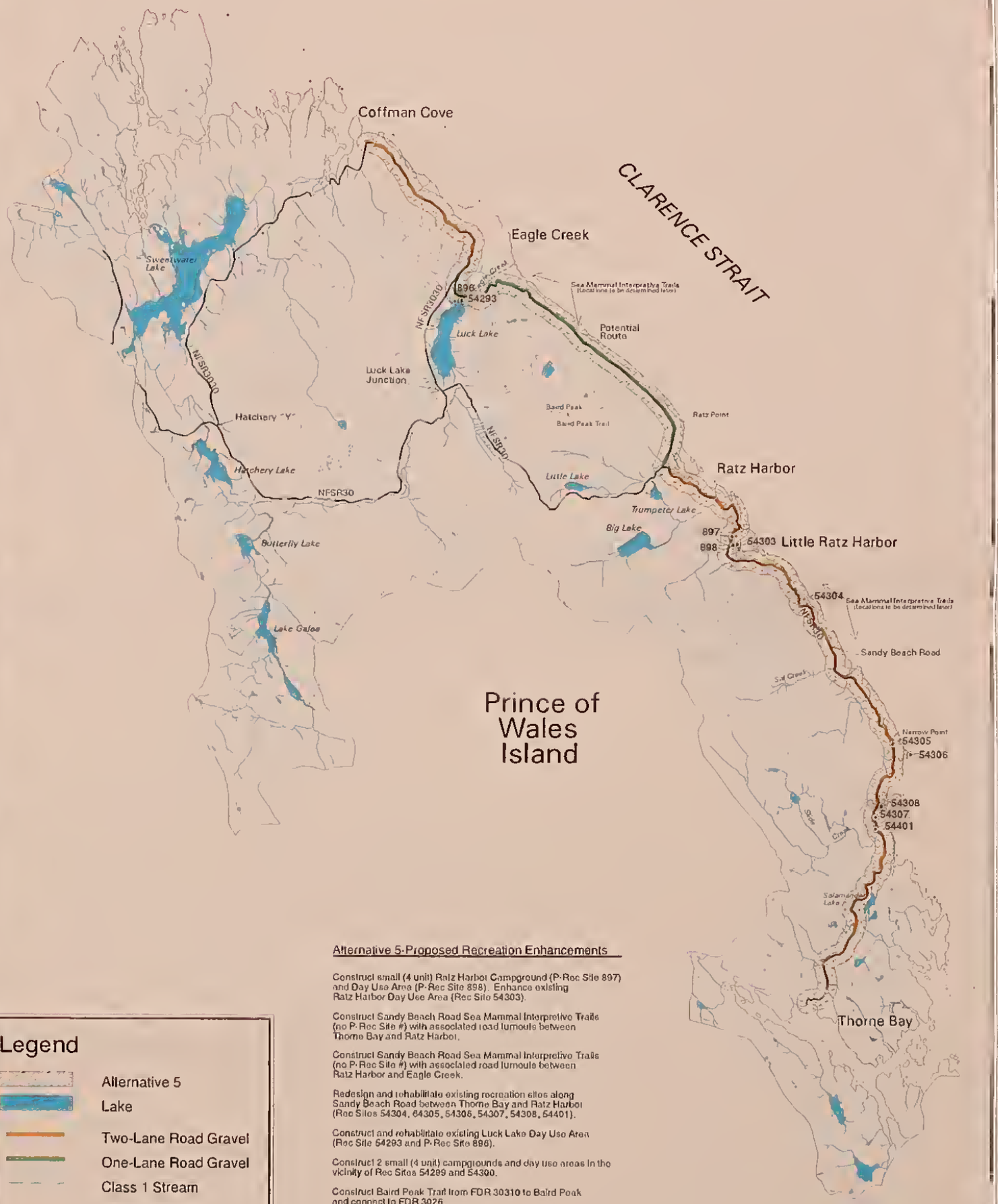
0 2.5 5 Miles

Figure 2-4

Data obtained from USDA Forest Service, Tongass National Forest, KTN Area GIS

Sandy Beach Road Project

Alternative 5



Alternative 5-Proposed Recreation Enhancements

Construct small (4 unit) Ratz Harbor Campground (P-Rec Site 897) and Day Use Area (P-Rec Site 898). Enhance existing Ratz Harbor Day Use Area (Rec Site 54303).

Construct Sandy Beach Road Sea Mammal Interpretive Trails (no P-Rec Site #) with associated road turnouts between Thorne Bay and Ratz Harbor.

Construct Sandy Beach Road Sea Mammal Interpretive Trails (no P-Rec Site #) with associated road turnouts between Ratz Harbor and Eagle Creek.

Redesign and rehabilitate existing recreation sites along Sandy Beach Road between Thorne Bay and Ratz Harbor (Rec Sites 54304, 54305, 54306, 54307, 54308, 54401).

Construct and rehabilitate existing Luck Lake Day Use Area (Rec Site 54293 and P-Rec Site 896).

Construct 2 small (4 unit) campgrounds and day use areas in the vicinity of Rec Sites 54289 and 54300.

Construct Baird Peak Trail from FDR 30310 to Baird Peak and connect to FDR 3026.

*See Table 2-1 for names of Existing Recreation Sites

Legend

- Alternative 5
- Lake
- Two-Lane Road Gravel
- One-Lane Road Gravel
- Class 1 Stream
- Class 2 Stream
- Class 3 Stream
- Class 4 Stream
- Roads
- Project Boundary
- Recreation Site

N

0 2.5 5

Miles

Figure 2-5

Data obtained from USDA Forest Service, Tongass National Forest, KTN Area GIS

Alternative 5 would provide the most direct link between Coffman Cove and Thorne Bay. The segments of road closest to the communities would be upgraded to a two-lane standard to reflect higher expected use on these segments. This alternative would improve service, safety and convenience of travel for local residents. Because the entire route is located at a low elevation (below 400 feet above mean sea level), the route would remain passable without plowing throughout the year most years. Alternative 5 would increase shoreline recreation access and opportunity along the new road segment.

Table 2-1. Summary of treatment options selected for each road segment

Segment Locations	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Common route: Thorne Bay to Ratz Harbor	no treatment	paved 2-lane	paved 2-lane	paved 2-lane	gravel 2-lane
Ratz Harbor to Luck Lake Junction	no treatment	paved 2-lane	paved 2-lane	gravel 1-lane	no treatment
Luck Lake Junction to Hatchery Y	no treatment	paved 2-lane	no treatment	no treatment	no treatment
Eagle Creek to Coffman Cove	no treatment	no treatment	paved 1-lane	paved 2-lane	gravel 2-lane
Luck Lake Junction to Eagle Creek	no treatment	no treatment	paved 1-lane	gravel 1-lane	no treatment
Eagle Creek to 3030100	no treatment	no treatment	no treatment	no treatment	gravel 1-lane
Potential route: Ratz Harbor to Eagle Creek	-----	-----	-----	-----	gravel 1-lane

Bridges The existing Sandy Beach Road routes currently contain 8 significant bridge crossings, only one of which has a two lane deck width. It is anticipated that for single lane construction scenarios, inspection of these spans and evaluation of the current load rating will be performed to insure they are sufficient to meet construction / reconstruction objectives. Two lane construction scenarios will require that the bridges shown in Table 2-2, below, will be upgraded through widening of the abutments, superstructure, and deck. Where upgrades are not feasible, bridges will need to be replaced with a new two lane structure. The following table details anticipated bridge replacement and upgrade needs.

Table 2-2. Bridge crossings, by alternative.

Bridge	Mile Post	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Slide Creek	23.76	Upgrade	Upgrade	Upgrade	Upgrade
Barren Creek	24.48	Upgrade	Upgrade	Upgrade	Upgrade
Sal Creek	28.83	na1	na1	na1	na1
Little Ratz	34.02	Replace	Replace	Replace	Replace
Big Ratz	37.75	Upgrade	Upgrade	na1	na1
Little Lake	37.88	Upgrade	Upgrade	na1	na1
Luck Creek	45.3	Upgrade	Upgrade	na1	na1
Eagle Creek	1	na1	na1	na1	na1

1 No work is required to meet the design objectives.

Forest Service Preferred Alternative

Comparing the benefits and adverse effects of each alternative against the issues, the Forest Service has identified Alternative 4 as the Preferred Alternative in this Environmental Assessment. A final selection of an alternative and associated mitigation measures will be made by the District Ranger in the Decision Notice and, if appropriate, Finding of No Significant Impact.

Comparison of Alternatives by Issue

This section compares the way each alternative affects the key issues identified during scoping. The comparison is based on both qualitative and quantitative measures of outputs and effects, and is summarized in Table 2-3.

Issue 1: Improve safety and convenience (including "quality of ride") of travel in the project area.

Several design factors contribute to a road's safety, but most are difficult to quantify without extensive analysis. Stopping distance tends to be shorter where sight distances are longer, and may also be improved on paved, rather than gravel, surfaces. Roads would be designed for maximum safety under all alternatives, using the design standards most appropriate for site-specific conditions. Alternatives 2, 3, 4 and 5 would improve conditions over Alternative 1.

Convenience is also difficult to measure, but travel time can be used as an indicator. Under current conditions, travel time between Coffman Cove and Thorne Bay is about 110 minutes. Based on preliminary design speeds, Alternative 2 would reduce travel time to about 80 minutes. Alternative 3, 4, 5 would all reduce travel time to about 60 to 65 minutes.

Maintenance, including frequency and cost, can also be considered a measure of convenience. Under existing conditions, the cost of annual maintenance between Thorne Bay and Coffman Cove via Luck Lake is $49,000. Periodic grading of the gravel-surfaced road segments would require additional annual maintenance costs of

$16,000 for Alternatives 4 and $58,000 for Alternative 5, and eventual resurfacing as the gravel is depleted.

Issue 2: Provide year-round, all-weather access between Coffman Cove and Thorne Bay via a shorter, more direct route.
Alternatives 2 and 3 address this issue by including paving of the road segment between Ratz Harbor and the Luck Lake Junction. This segment travels over an alpine pass that is often closed in the winter, due to heavy snow accumulations. Paving of this segment would provide a surface suitable for plowing during the winter, but at this time, there is no commitment of maintenance funding to snow removal. Alternative 5 travels along a low-elevation alignment, and would remain passable without plowing throughout the year most years. Alternative 4 would not provide a possible year-round, all-weather route.

Issue 3: Meet increased demand expected to result from new ferry terminal.
The demand for motorized use of Project area roadways is expected to increase due to the development of a new ferry terminal at Coffman Cove. Increases in the resident population and tourism are also expected to increase the demand for motorized use of roadways. Alternative 1 would have very little ability to meet this increased demand. Alternative 2 would be highly capable of meeting the increased demand for roads, while Alternatives 3 or 4 would have a moderate ability to do so. Alternative 5 would be better able to meet this increased demand for roads than would Alternative 1, but would be less able to do so than the other alternatives.

Issue 4: Improve access to existing recreation facilities and increase recreation opportunities.
The reconstruction of the Sandy Beach Road has the potential to improve access to existing recreational facilities. It also provides opportunities to create new recreation facilities and enhance existing facilities. Alternative 1 would provide no recreation enhancements. Alternative 2, 3, 4, or 5 would create and/or enhance 6, 3, 3, and 7 facilities, respectively.

Road reconstruction would also affect existing recreation opportunities within the Project area. Increased road access (Alternatives 2, 3, 4, or 5) and overall user numbers (under all alternatives, due to the proposed ferry terminal at Coffman Cove) may generate crowded conditions at some existing recreation sites. While Alternatives 1, 2, 3, or 4 would not change existing Recreation Opportunity Spectrum (ROS) settings or affect the inventoried roadless area between Ratz Harbor and Eagle Creek (along Clarence Strait), Alternative 5 would change the existing Semi-Primitive Motorized setting to Roaded Natural and construct 6.0 miles of road through the Ratz roadless area.

Issue 5: Provide, maintain or improve fish passage at all crossings.
Road reconstruction in all of the action alternatives would include renovation of stream crossings from Thorne Bay to Ratz Harbor (Common route). Culvert replacement/ renovation along NFSR 30 between Ratz Harbor and the Luck Lake junction is proposed in alternatives 2, 3, and 4. Alternative 2 is the only alternative that would upgrade problem culverts along NFSR 30 between the Luck Lake

Junction and the Hatchery Y. Alternatives 3 and 4 would replace or modify problem stream structures along NFSR 3030 between the Luck Lake Junction and Coffman Cove. Alternative 5 includes culvert replacement along NFSR 3030 between Eagle Creek and Coffman Cove. Alternative 5 is the only alternative proposing new road construction with associated culvert placement.

Issue 6: Reduce sediment contribution into streams to protect water quality.
Paving of existing gravel roads would significantly reduce inputs of sediment to the aquatic environment. Alternatives 2 and 3 contain similar levels of paving but treat different routes between the Luck Lake Junction and Coffman Cove. Alternative 4 would reduce road-related sediment inputs along those road segments nearest to the two urban centers, Coffman Cove and Thorne Bay. No paving would occur under Alternative 5 and approximately 6 miles of new roadway would be constructed, crossing approximately 7 fish-bearing streams.

Issue 7: Protect natural resource values in the roadless area.
The only alternative that would affect natural resource values in the Ratz (Baird Peak) roadless area is Alternative 5, which includes a segment of new road construction linking the Sandy Beach Road near Ratz Harbor to FR3030100 near Eagle Creek. This alternative would slightly increase road density in the project area, and would provide vehicle access into an area currently accessible only by boat. These changes would affect wildlife habitat by decreasing deer habitat capability and would likely increase hunting and competition for subsistence wildlife. There is a strong correlation between hunting and trapping success for deer, bear, marten and wolves with road density and road location. This relationship has been well documented in Southeast Alaska (Doyle et al. 1988; Suring 1993; Person et al. 1996). A new road in the Ratz roadless area could impact local populations of these and other species. Fishing pressure in the vicinity of Eagle Creek would also likely be increased as a result of this alternative.

Issue 8: Consideration of regulatory setting and requirements, balanced use, funding mechanisms, and effects on project schedule associated with entry into the roadless area.
Like Issue 7, this issue relates only to Alternative 5, since no other alternative includes entry into the roadless area. The status of the Roadless Area Conservation Rule is uncertain, and could affect feasibility of this alternative in terms of federal and state policies and funding.

Table 2-3. Comparison of Action Alternatives by Issue, Output and Effect

Issue, Output or Effect	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
total miles of road treated	----	36.8	36.0	36.0	33.5
miles of reconstruction	----	36.8	36.0	36.0	27.5
miles of new road	----	0	0	0	6.0
miles of graveled road	----	0	0	11.6	27.5
miles of paved road	----	36.8	36.0	24.3	0
road density	1.56	1.56	1.56	1.56	1.59
route passable/plowable in winter	N	Y	Y	N	N[3]
travel time between Coffman Cove and Thorne Bay, in Minutes	110	80	65	65	60
recreation facilities enhanced	0	6	3	3	7
changes in ROS settings	None	None	None	None	Semi-Primitive Motorized to Roaded Natural along new road segment
ability to meet increased demand	Very Low	High	Moderate	Moderate	Low to Moderate
miles of MMI = 4 slopes	----	0.8	0.8	0.8	0.6
Reduction of sediment routed to streams based on paved segments	----	Significant reduction along FH30	Significant reduction along FH30 and Luck Lake route	Reductions localized near urban areas	Minimal reduction of road sediment inputs to streams
# of fish-bearing stream crossings (type I&II)	----	47	40	40	43
Total Cost, in Millions[1]	$0	$55.2	$54	$43.4 ($14.7)[2]	$16.5

[1] Total cost includes the cost of replacing and/or upgrading structures such as bridges and culverts, in addition to road construction/reconstruction. Cost estimates are based on cursory field evaluation, GIS, photo analysis, the Forest Service Region 6 Cost Estimating Guide For Road Construction, and local experience.

[2] Total cost of Modified Alternative 4.

[3] Would be passable without plowing throughout the year most years.

Mitigation Measures

The Forest Service uses many mitigation and preventive measures in the planning and implementation of land management activities. The application of these measures begins during the planning and design phases of a project. These measures come from or link to the Forest Plan, and continue through all phases of subsequent management related to the project. These measures, called Standards and Guidelines, are described below. In addition to Standards and Guidelines and Best Management Practices (BMPs), specific mitigation measures may be recommended for activities associated with a specific alternative. Specific measures are included in Chapter 3, following discussions about the effects of each alternative.

Forest Plan Standards and Guidelines

The following items are listed to highlight some of the key mitigation measures, findings or processes applied to the project that are common to all alternatives; they are by no means a complete list.

Beach and Estuary Fringe: The beach and estuary fringe is an area of approximately 1,000 feet inland from mean high tide around all marine coastline. Roads are to be located outside the fringe when possible.

Fish and Marine Habitats: Forest Plan Standards and Guidelines for riparian areas are applied to all fish streams within the project area, and to non-fish-bearing Class III streams. Riparian Management Areas are areas of special concern to fish, other aquatic resources, and wildlife. These areas are delineated according to the process group direction in the Riparian forest-wide standards and guidelines.

Heritage Resources: The Forest Service will seek concurrence with the Alaska State Historic Preservation Officer and other interested parties that no sites eligible for the National Register of Historic Places will be affected by any of the alternatives.

Recreation: The Forest Plan seeks to provide opportunities and programs appropriate to the forest environment that help participants experience and understand nature. Recreation enhancements proposed under any of the alternatives will be designed to complement commercial public services within communities or on private or other public land. Several projects are proposed that will support boater access, consistent with Forest Service Standards and Guidelines.

Scenery: Forest Plan Standards and Guidelines for scenery are based on Visual Quality Objectives (VQO's) that provide direction for landscapes within each LUD. The long-term desired future condition for a specific area is the maintenance of a visual quality level that is at least as high as the adopted VQO for that area. VQO's are applied to any activity, including road construction or reconstruction, that has the potential to affect the visual character of the landscape.

Soils, Water Quality and Wetlands: Road locations avoid slopes greater than 67 percent, unstable areas, and slide-prone areas where it is feasible to do so.

Road construction or reconstruction will be designed to avoid high value wetlands, where practicable, and minimize impacts on all wetlands. A jurisdictional wetland delineation will be completed during the summer of 2001 to evaluate wetland impacts and design a suitable mitigation plan.

Subsistence: All alternatives have been evaluated for effects on subsistence, according to ANILCA, Title VIII, Section 810.

Threatened, Endangered and Sensitive (TES) Species: Standards and Guidelines will be applied as needed to avoid adverse effects on listed or sensitive species. Surveys for TES plants and northern goshawk will be conducted in the summer of 2001 to define site-specific protection measures that should be implemented.

Wildlife Habitat: Standards and Guidelines will be applied to protect important habitat and minimize the risk of disturbance during construction.

Best Management Practices (BMP's)

Water Quality: BMP's are designed to prevent or reduce the amount of pollution from nonpoint sources or other adverse water quality impacts while meeting other goals and objectives. BMP's are standards to be achieved, not detailed or site specific prescriptions or solutions. BMP's as defined in the USDA Forest Service Soil & Water Conservation Handbook are mandated for use in Region 10.

Construction in Wetlands: Road realignment should avoid all wetlands and if at all possible, while still adhering to controlling design elements and standards. Where wetlands are crossed, the road should be constructed to allow the natural cross drainage to be maintained.

A commonly used road construction technique is to float the road across the surface of a wetland. A layer of rock, several feet deep, is placed directly on the undisturbed sod/root mat, or if especially soft, on a log corduroy or geotextile base. Settlement of the floating subgrade over the years varies depending on the depth of the underlying organic material. The flexible nature of the floating subgrade is adequate for aggregate surfaced roads that can be periodically graded back into shape and resurfaced following settling. However, the irregular settling makes this construction technique unsuitable for use in supporting a asphalt paved road surface.

A stable subgrade for an asphalt paved road across wetlands is achieved by excavating unsuitable material down to a stable base of competent material and backfilling, usually with shot rock. Excessively deep wetlands are partially excavated and backfilled with rock. Using wetlands as endhaul sites (dumping areas for excavated material) will be avoided.

Steep slopes: Where side slopes are too steep to support a fill slope, the entire road bed must be built on an excavated bench. This usually occurs on slopes in excess of 50%. Excavated material is hauled to a stable waste site or placed in portions of the road requiring fill material, thus avoiding side-casting on steep slopes. Full bench cuts typically result in high cut banks, exposing a significant area of mineral soil to erosion

potential. In these situations, appropriate erosion control measures should be employed. High cut banks can also have high visual impact.

Construction Timing: Reconstruction operations should be timed to adhere to Alaska State Statute Title 16 regarding in-water work.

Traffic control/road closure during reconstruction: Public access to roads may be restricted, and some roads closed to public use during reconstruction operations.

Monitoring

Monitoring activities can be divided into Forest Plan monitoring and project-specific monitoring. The three categories of Forest Plan monitoring include:

Implementation Monitoring
Used to determine if the goals, objectives standards and guidelines and practices of the Forest Plan are implemented in accordance with the Forest Plan.

Effectiveness Monitoring
Used to determine if the Forest Plan standards and guidelines and practices, as designed and implemented, are effective in accomplishing the desired result.

Validation Monitoring
Used to determine whether the data, assumptions, and estimated effects used in developing the Forest Plan are correct.

Effectiveness and validation monitoring are not typically done as part of project implementation. However, implementation monitoring and any project-specific monitoring are important aspects of the project.

Routine implementation monitoring assesses whether the project was implemented as designed, and whether or not it complies with the Forest Plan. Road inspectors will conduct monitoring during and after construction to ensure that Forest Service Standards and Guidelines and any project-specific mitigation measures are implemented. Resource specialists may also be involved in implementation monitoring, to provide technical advice when needed.

Chapter 3
Environment and Effects

INTRODUCTION

Chapter 3 provides information about the existing environment of the Sandy Beach Project Area and the potential consequences of the proposed action on the environment. The analysis focuses on the key resources and issues identified during the scoping process.

OVERVIEW

Chapter 3 is organized to focus on how each of the alternatives would affect key issues. Several of the issues are very closely related. For this reason, information about effects may be presented in more than one section. For a complete analysis, it will be important to read all the sections, including Other Environmental Considerations, which address resources that would not be affected by the proposed action, or that must be evaluated in order to meet regulatory requirements, but were not identified as a high priority for assessment during the scoping process.

ANALYZING EFFECTS

Environmental consequences are the effects of implementing an alternative on the physical, biological and social environment. CEQ regulations implementing NEPA specify several categories of environmental consequences. These include direct, indirect, cumulative and unavoidable adverse effects; and irreversible and irretrievable commitments. These categories are discussed below. Also included in this section is the available information upon which much of the analysis is based.

Direct, Indirect, and Cumulative Effects

Direct environmental effects are those occurring at the same time and place as the initial cause or action. Indirect effects are those that occur later in time or that are spatially removed from the activity. Cumulative effects are defined as those resulting from incremental effects of the proposed action, when added to other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such other actions.

Unavoidable Adverse Effects

Some actions may cause adverse environmental effects that cannot be avoided or effectively mitigated.

Irreversible and Irretrievable Commitments

Irreversible commitments are decisions affecting non-renewable resources such as soils, wetlands, and unroaded areas. For example, construction of a road through a roadless area would cause environmental changes that would only be reversed over a long period of time, if at all.

Irretrievable commitments are defined as opportunities that are foregone for a period of time as a result of implementing the proposed action. An example of an irretrievable commitment would be paving of a road segment from "point A" to "point B" along a particular route at one point in time, if a different route between the same points were to be upgraded at a later date.

Available Information

Much of the environmental data for the Tongass National Forest resides in an electronic database formatted for a geographic information system (GIS). The Forest uses GIS software to assist in the analysis of these data and to present the results of analysis in numerical or map format. Analyses and maps presented in this EA are based primarily on the Forest GIS data. In addition to the GIS database, the analyses presented in this EA incorporate baseline data collected for other projects in the same vicinity. Such projects include the Luck Lake Timber Sale EIS, the Coffman Cove Road EA, and an ongoing joint Forest Service/Alaska Department of Fish and Game (ADF&G) road condition survey designed to document conditions of forest roads and highways throughout the Tongass National Forest. Inventories include observations of roads, culverts, bridges, drainage ponds, and ditch lines. In some instances, fish presence is documented within stream segments adjacent to the roads.

ENVIRONMENT AND EFFECTS ON THE SIGNIFICANT ISSUES

Issue 1: Improve safety and convenience (including "quality of ride") of travel in the project area.

Existing Conditions

Safety and convenience are closely associated with design speed and sight distance on a given segment of road. The existing transportation system segments in the project area were originally designed and constructed to function as access for management of the timber resource. Consequently the design elements and standards used in the design and construction of these segments does not identify safety and convenience as primary issues. The existing routes, with their lower design speeds and decreased sight stopping distance due to one-lane construction and sections of poor horizontal alignment, do not currently meet convenience and safety objectives of the multi-use driver.

Safety relates directly to the ability of the driver to avoid collision. The ability to avoid collision can be measured in terms of stopping sight distance, or the sight distance required to identify an object, react to the object, and then stop the vehicle before reaching that object.

Design speed can be used as a measure of convenience. Higher design speeds result in decreased travel time and therefore increased driver convenience. The most direct existing route between Thorne Bay and Coffman Cove (via Luck Lake) contains significant sections of low speed road resulting in driving times of an hour and one quarter to roughly one hour and three quarters. When snow blocks the alpine pass traversed by this route, the only access to Coffman Cove is via Forest Highways (NFSR) 42, 43 and 44 and travel time takes two to three hours.

Effects of the Alternatives

Proposed reconstruction alternatives for the Sandy Beach Road from Thorne Bay to Coffman Cove address both the resource management vehicle and the multi-use vehicle. For this reason, the design approach is to directly address safety and convenience by increasing both sight stopping distance and design speed, using AASHTO design standards. It should be noted that AASHTO considers a threshold of 300 ADT's as critical to design; below this level, some standards are not necessarily applicable. Data collected in the general project area (Coffman Cove Road Corridor) in 1996 indicate 48 ADT's (USDOT 2000).

Sight distance is the length of roadway ahead visible to the vehicle operator. At a minimum, this distance should be sufficiently long to enable a vehicle traveling at or near the design speed to stop before reaching a stationary object in its path. For Minor Rural Collector Roads AASHTO recommends that sight distance at every point along the roadway be at least that required for the below-average driver or vehicle to stop within this distance. Figure 3-1 shows that an increase in design speed from 20 mph to 30 mph results in a 72 percent increase in the required safe stopping distance on wet asphalt or wet packed gravel. Increased stopping sight distance results in an increase in construction / reconstruction effort on segments containing poor alignment.

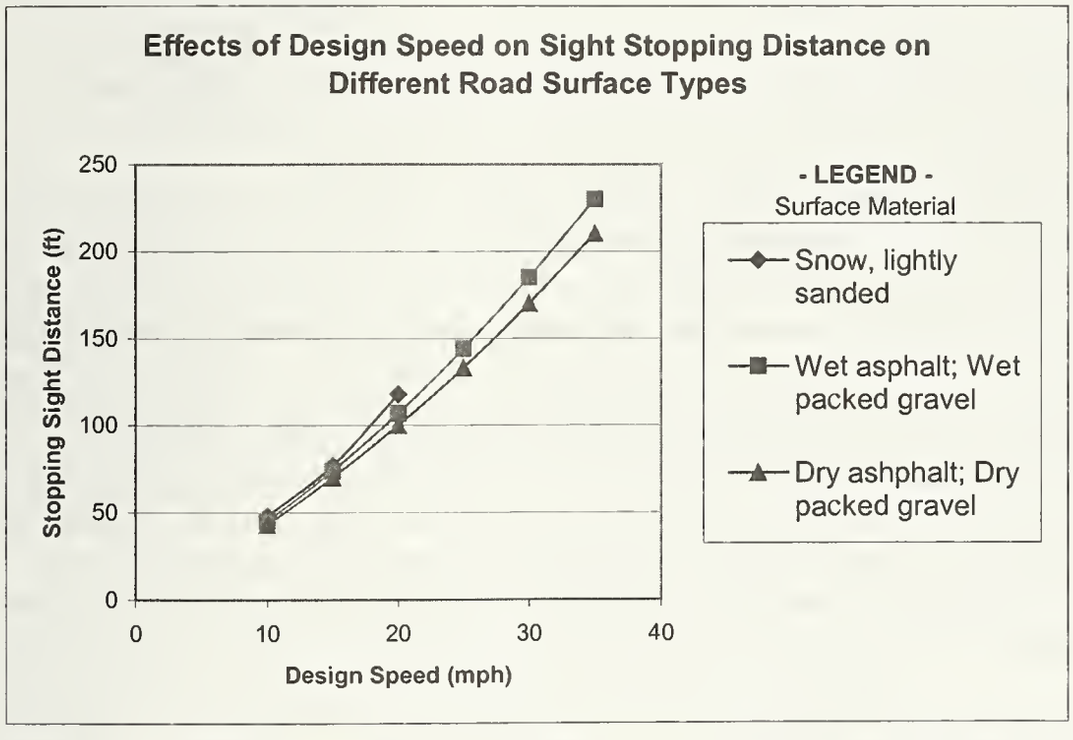


Figure 3-1. Effects of design speed on sight stopping distance on different road surface types.

Roads constructed as two lane vs. one lane can also have a significant influence on stopping sight distance. The designer must consider the situation where two vehicles meet on a given road segment. To provide for safe stopping of both vehicles, the designer must double the stopping sight distance. This is due to the relationship between

stopping sight distance and design speed, as shown in Figure 3-2 and the relative speed of two vehicles approaching one another. As two vehicles approach one another, traveling at the same design speed, their relative speed is double the design speed they are traveling. Stopping sight distance increases from 50 feet to 100 feet for a design speed that increases from 10 mph to 20 mph.

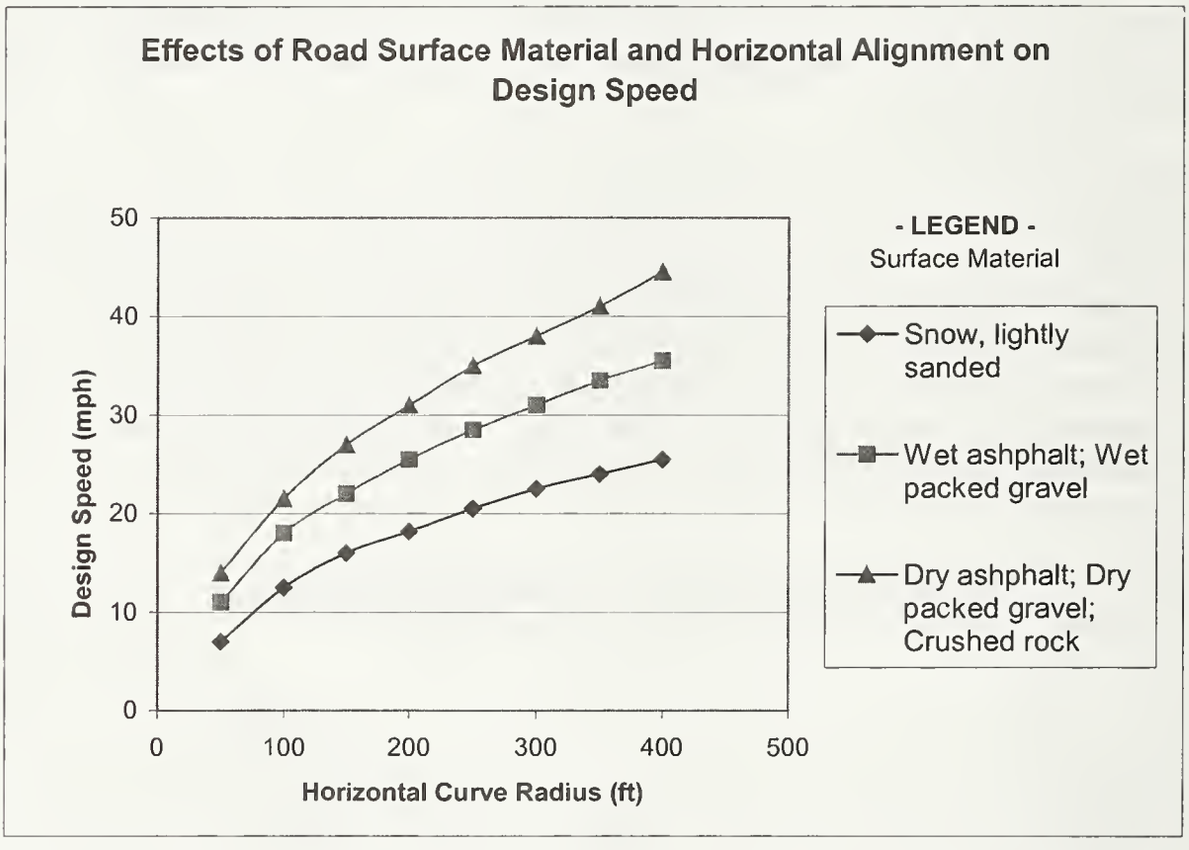


Figure 3-2. Effects of Road Surface Material and Horizontal Alignment on Design Speed.

Of specific concern on the Minor Rural Collector Road, is the ability to maintain stopping sight distance across horizontal curves. Sight obstacles such as road cut banks and vegetation commonly reduce sight distance below minimum stopping distances for given design speeds. Minimizing this effect on Minor Rural Collector Roads often involves increasing road right-of-way clearing or cut bank excavation to meet minimum sight distance requirements.

Under the proposed construction scenarios for Alternatives 3, 4 and 5, travel time from Thorne Bay to Coffman Cove is expected to be about an hour. Alternative 2 will have a travel time of approximately one hour and 20 minutes (Table 3-1).

Table 3-1. Typical Travel Time (minutes), Thorne Bay to Coffman Cove

Alternative	Approximate Travel Time (min)
1	110
2	80
3	65
4	65
5	60

Issue 2: Provide year-round, all-weather access between Coffman Cove and Thorne Bay via a shorter, more direct route.

Existing Conditions

Current winter travel between Thorne Bay and Coffman Cove is accomplished via NFSR 20. The existing Sandy Beach route (i.e., NFSR 30) typically receives snow accumulations on various segments to a point that typically prevents vehicle travel. Winter travel time from Thorne Bay to Coffman Cove, via NFSR 20, is approximately 3 hours.

Effects of the Alternatives

Options for providing all-weather travel between Thorne Bay and Coffman Cove via a shorter, more direct route than NFSR 20 are addressed by Alternatives 2, 3 and 5. Under current conditions, snow accumulates in the vicinity of the alpine pass between Ratz Harbor and the Luck Lake Junction during the winter, and the pass is not plowed. Gravel-surfaced roads can be plowed occasionally (e.g., twice a year), but frequent plowing would degrade the road surface and possibly the subgrade. Alternative 4 does not include paving of this segment, and would not improve travel conditions between Thorne Bay and Coffman Cove during the winter. Alternatives 2 and 3 do include paving, and travel times could potentially be reduced as shown below. However, at the current time, there is no commitment to regular snow removal. Without snow removal, neither of these alternatives would provide a direct route year-round service between the two communities.

Alternative 5 would provide year-round service between Thorne Bay and Coffman Cove most years. Snow accumulation at higher elevations along the route (i.e. where the proposed road segment joins FS 3030100) would likely require snow removal to keep the route open year-round during periods of heavy snow accumulations.

Table 3-2. Typical Winter Travel Time (minutes), Thorne Bay to Coffman Cove

Alternative	Approx. Travel Time (min)	All Weather Access Description
1	180	Access via NFSR 20 to NFSR 3030
2	130	Regular snow plowing of high elevation segments
3	100	Regular snow plowing of high elevation segments
4	180	Access via NFSR 20 to NFSR 3030 (regular plowing of alt. 4 route not recommended)
5	95	Low elevation, minimal snow accumulation

In addition, an analysis was completed to compare log transport cost over State Highway 929 (FH 43) versus log transport cost over the proposed Sandy Beach Routes.

For this analysis, transport was assumed to originate at the junction of FH 44 and State Highway 929 and terminate at the town of Thorne Bay. The Region 10 National Forest Timber Sale Appraisal System was used to determine truck unit operating cost. Travel distances were taken from the Forest Service Corporate GIS database and design speeds of 45 mph and 25-35 mph for the State Highway and Sandy Beach Routes, respectively were used. It was further assumed that standard highway loads (i.e., 80,000 GVW or 5 MMbf load) would be transported over State Highway 929 and off-highway loads (i.e., 8 MMbf load) would be hauled over the Sandy Beach Routes. Table 3-3 shows the travel times and cost for each alternative.

Table 3-3. Log Transport Cost Analysis.

Alternative	Truck Round Trip Travel Time** (Min)	Haul Cost ($/Mbf)
1*	145	$29.62
2	199	$25.37
3	240	$30.60
4	240	$30.60
5	229	$28.05

* Alternative 1 is no action on the Sandy Beach Routes, therefore haul will be via State Highway 929.

** Includes 30 minutes truck unload and 30 minutes truck load times.

As shown on Table 3-3, transportation via the State Highway is not significantly less expensive and in some instances is more costly, than transport via routes defined by the action alternatives.

Issue 3: Meet Increased Demand Expected to Result from a New Ferry Terminal
Existing Conditions

Under current conditions, travel from Coffman Cove to parts of the island other than Thorne Bay is generally accomplished via a route comprised of sections of NFSR 3030, 30, 23, and 20. As mentioned under Issue 1, ADT's in the general project area (Coffman Cove Road Corridor) were estimated in 1996 at 48, with a predicted increase to 120 ADT by 2021 (USDOT 2000). Increased use of and demand for roadways within the Sandy Beach project area is expected to result from the construction of a new ferry terminal at Coffman Cove. Demand for and use of roadways within the project area would likely increase even if the new ferry terminal is not constructed at Coffman Cove, as tourism continues to increase and more people are choosing to reside on Prince of Wales Island. This issue and the effects of the Sandy Beach Road Reconstruction are discussed below.

New ferry terminal at Coffman Cove: The Alaska Marine Highway System (AMHS) provides reliable and efficient transportation of people, goods, and vehicles between Alaskan communities, Canada, and the lower 48 states, while providing opportunities to develop and maintain a reasonable standard of living and achieve a higher quality of life. The AMHS provides Alaskans with basic transportation that allows community access to commodities and health, legal, government and social services. Such transportation meets the various needs of isolated communities and provides the transportation needed for economic development.

AMHS provides year-round scheduled ferry service throughout Alaska, extending south to Prince Rupert, British Columbia and Bellingham, Washington. The system connects communities with each other, with regional centers, and with the continental road system. It is an integral part of Alaska's highway system, reaching many communities that would otherwise be effectively cut off from the rest of the state and nation.

Use of the AMHS as a whole, and in Southeast in particular, is generally highest in the summer and lowest in the winter. Use generally increases during spring months and decreases during the fall months (AMHS 1998). Currently, the service between Ketchikan and Hollis by AMHS ferry is five trips a week in summer and three trips a week during winter. For a substantial part of the winter, this service is further reduced to once a week.

Prince of Wales Island customers have repeatedly demanded additional services and improvements to existing services. Rather than rely on the uncertain plans of the state, the communities of Prince of Wales Island took the initiative in 1997 to meet their own ferry service needs. They formed the Inter-Island Ferry Authority (IFA) to provide daily ferry service from Prince of Wales Island to Ketchikan and to provide a northern link to the communities of Petersburg and Wrangell. The IFA plans to use the state AMHS dock at Hollis for ferry services to Ketchikan. The AMHS will terminate its Ketchikan to Hollis route once the IFA begins service (USDA Forest Service 2000a).

The IFA has plans for a second ferry that will run from Coffman Cove, within the project area, to southern Mitkof Island, which will allow access to Petersburg, and possibly to

Wrangell Island, as well (USDA Forest Service 2000a). Such a terminal would increase traffic on roadways within the project area.

Other sources of road use and demand: The population of Prince of Wales Island grew rapidly in the 1980s making it one of the fastest growing places in Alaska. In 1990 the population of Prince of Wales Island was 4,642. The highest recorded population for Prince of Wales Island was in 1996 at which time the population stood at 5,184 (Alaska Community Database Online 2001). The population of Prince of Wales Island in 2000 was 4,581 slightly below the 1990 population level. Based on population projections provided by the Alaska Department of Labor, Prince of Wales Island will have a population of approximately 7,611 in 2018 (Alaska Department of Labor 2001). Figure 3-3 shows population values for Prince of Wales Island and the communities of Craig, Klawock, and Thorne Bay.

Even if a ferry terminal is not built at Coffman Cove, use of the well-known and already popular roadways within the project area is likely to increase over time. Tourism will continue to be an expanding industry in Southeast and the demand for sightseeing tours and other services is expected to grow in pace with the number of visitors (USDA Forest Service 2000a). Many of these sightseeing tours and other services would rely on the project area road system.

Publicly funded projects will bring construction traffic and encourage residential development. New residents will use the project area roads for transportation and recreation. Infrastructure improvements, which could include an IFA terminal at Coffman Cove, are planned in many communities using various combinations of federal, state and local funds.

	1980 Census*	1990 Census*	Highest Year*	2000 Census*	2018** (Projected)
Prince of Wales Island	3,822	4,652	5,184	4,581	7,611
Craig	527	1,260	2,144	1,397	
Klawock	318	722	779	854	
Thorne Bay	377	581	628	557	

* Alaska Community Database Online (2001)

** Alaska Department of Labor (2001)

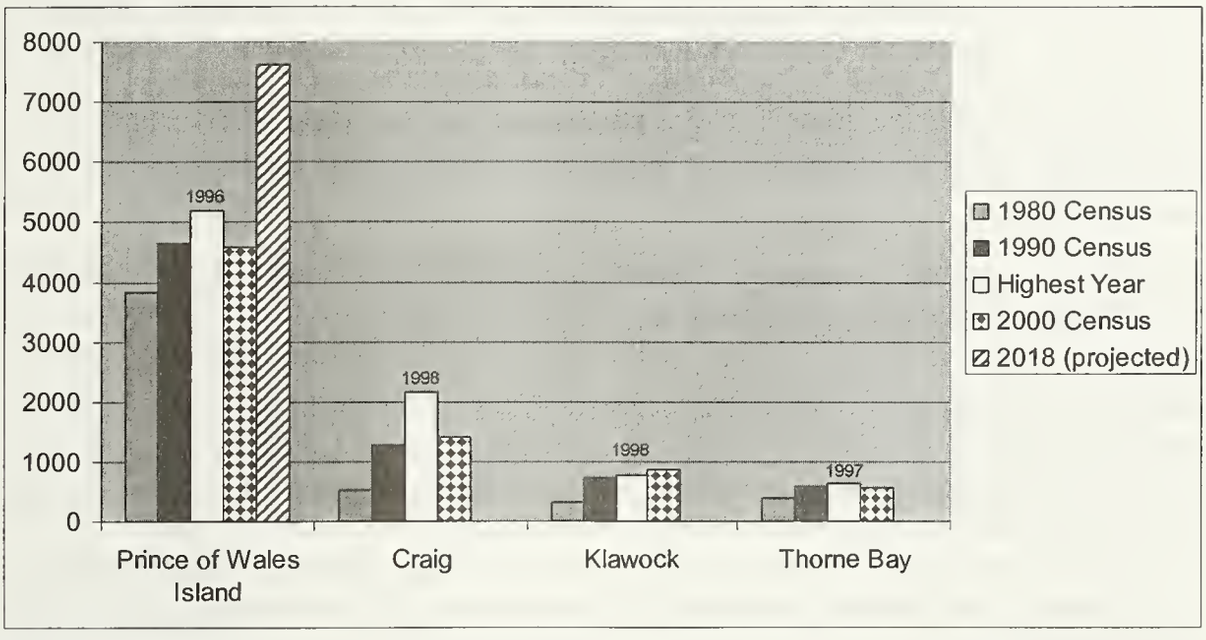


Figure 3-3. Population of Prince of Wales Island.

Slow but stable employment growth of about one percent will characterize the Southeast economy in the near term. Strong performance will likely come from services and publicly funded construction, while the wood products industry will slow overall job growth in the region (USDA Forest Service 2000a).

Effects of the Alternatives

The Sandy Beach Road reconstruction alternatives would have varying abilities to meet the increased vehicular traffic generated by the proposed Coffman Cove Ferry terminal and other sources of increased traffic. The ability of each alternative to meet the expected increase in demand is described below.

Alternative 1 (the No Action Alternative) has very little ability to meet the increased demand for roads in the project area. The existing roadways within the project area, which were originally constructed to support logging and heavy industrial traffic, would remain. These roadways are gravel surfaced, one-lane wide, have poor horizontal and vertical geometry, and have infrequent pullouts for passing. Increased traffic from a new

ferry terminal and/or other sources would exacerbate existing problems on project area roadways. No recreation enhancements would be provided.

Alternative 2 would be highly capable of meeting the increased demand for roads. This alternative would provide a two-lane paved roadway for its entire length between Coffman Cove, the site of the proposed ferry terminal, and Thorne Bay. Such a roadway would have design high speed and present fewer impediments to travel, which would allow it to accommodate a high volume of traffic. This route is longer than that in other alternatives and would take motorists through more of the project area, further increasing the volume of traffic it can accommodate and the ability to disperse visitors into the project area/forest. Along the way, Alternative 2 would allow direct access to more existing recreation sites, including those of the Thorne River and Honker Divide, than other alternatives. This alternative also includes six readily accessible recreational enhancements.

Alternative 3 would be moderately capable of meeting the increased demand for roads. The south portion of this route (Thorne Bay to the Luck Lake junction) would be two-lane paved and the north portion of the route (Luck lake Junction to Coffman Cove) would be one-lane paved. Paved two-lane areas would have a high design speed and present few impediments to travel, allowing them to accommodate high traffic volumes. Although paved, the one-lane areas would have lower design speeds and more impediments to travel. This route is shorter than Alternative 2 (but longer than Alternative 5 and the same length as Alternative 4) and takes motorists through less of the project area. Alternative 3 includes three readily accessible recreational enhancements.

Alternative 4 would also be moderately capable of meeting the increased demand on roads. It would be two lanes and paved between Thorne Bay and Ratz Harbor and between Eagle Creek and Coffman Cove. Between Ratz Harbor and Eagle Creek the road would be one-lane with inter-visible turnouts and graveled. Paved two-lane areas would have high speeds and present few impediments to travel, allowing them to accommodate high traffic volumes. On the other hand, the one-lane gravel areas would have lower design speeds and present numerous impediments to travel. Alternative 4 would be the same length as Alternative 3 and provide access to many existing recreation sites. It includes three readily accessible recreation enhancements.

Alternative 5 would have a low to moderate ability to meet the increased demand on roads. Between Thorne Bay and Ratz Harbor it would be two lanes and graveled. Between Ratz Harbor and Coffman Cove, much of which would be new construction, the route would be one lane with inter-visible turnouts and graveled. The two-lane portion of the roadway would be an improvement over the existing one lane with inter-visible turnouts. Local residents would likely drive this route, as (unlike the other alternatives) it is short in length and would be open year-round most years. Summer season tourists would likely prefer the existing roadways to access recreation opportunities. However, due to the proximity to the coastline, some summer tourists may actually prefer the scenic

qualities of Alternative 5 to other alternatives that provide more recreational opportunities. Alternative 5 includes seven recreation opportunities.

Cumulative Effects

The demand for roads within the project area is expected to increase in the foreseeable future, due to the proposed ferry terminal at Coffman Cove, an increase in tourism, and an increase in the resident population. As stated earlier, resident population on Prince of Wales Island is projected to increase by 60 percent from 4,581 in 2000 to 7,611 in 2018. With the projected increase in resident population and tourism, ADT's are projected to increase from 48 in 1996 to 120 in 2021 (FHWA 2000b, in USDOT 2000).

Alternative 1, which would have little ability to meet this increase in demand, would likely result in slow speeds, long travel times, and an increased occurrence of accidents, relative to the action alternatives.

Alternative 2 would have the highest ability to meet the increase in demand for roads. As a result, it would likely result in relatively low travel times and a reduced occurrence of accidents, relative to Alternatives 3, 4, or 5.

Alternative 3 or 4 with a moderate ability to accommodate the increased demand would likely result in travel times that are better than Alternative 1 and 2. Accident figures for Alternative 3 or 4 are better than Alternative 1 and 5 and worse than Alternative 2.

Assuming that all motorists use the same route, Alternative 5 would be better able to meet the increased demand for motorized use than Alternative 1. However, it would be less able to meet future demand than would the other alternatives. In reality, this alternative may result in two separate routes between Thorne Bay and Coffman Cove. Recreationists would likely prefer the existing route, as it traverses more of the project area ecosystems and allows access to more recreation sites. However, due to the proximity to the coastline, some recreationists may actually prefer the scenic qualities of Alternative 5 to other alternatives that provide more recreation opportunities. Local residents, on the other hand, may prefer the more direct route.

Mitigation Measures

No mitigation measures are proposed.

Issue 4: Improve Access to Existing Recreation Facilities and Increase Recreation Opportunities

Existing Conditions

Travelers, especially those in recreational vehicles (RVs) have been using Prince of Wales Island in greater numbers during the last decade. Projections by the Inter-Island Ferry Authority (IFA) are for increase RV usage over the next few decades, fostered by the accessibility provided by improved ferry service. The proposed reconstruction of the Sandy Beach Road has the potential to improve access to existing recreational facilities within the project area, thereby increasing use of these facilities and changing the nature of the existing experience. The proposed road reconstruction also affords opportunities

to create new recreation facilities that add to the variety of recreation experiences available within the project area and relieve potential crowding at existing sites. The existing recreation environment and effects of the various project alternatives on that environment are described below.

Recreation Access and Opportunities

Prince of Wales Island, which covers 1,427,806 acres, plays an important role in Southeast Alaska by providing settings for various types of outdoor recreation, such as viewing scenery, boating, fishing, hunting, and hiking. Timber harvest has opened between 1,000 and 1,200 miles of road throughout the island to the general public. This high degree of accessibility creates many opportunities for more developed, roaded recreational activities and sets the island apart from most other areas of Southeast Alaska. As most of the existing primitive and semi-primitive opportunities in Southeast Alaska are reachable only by foot, boat, or plane, this high degree of accessibility also creates opportunities for road accessible semi-primitive and primitive activities that are unique in Southeast Alaska.

Recreation Opportunity Spectrum (ROS) Settings: The Forest Service developed the Recreation Opportunity Spectrum (ROS) system to help identify, quantify, and describe the variety of recreation settings available in National Forests. The ROS system provides a framework for planning and managing recreation resources. ROS settings are classified using the following seven elements:

- Visual Quality-the degree to which the natural landscape appears to be modified.
- Access-the mode by which activities are pursued and how easily users can travel to or within the setting.
- Remoteness-the perceived separation of the setting from human activity or structures.
- Visitor Management-the degree and appropriateness of how visitor actions are managed and serviced.
- On-Site Recreation Development-the degree and appropriateness of recreation facilities provided within the setting.
- Social Encounters-the degree of solitude of social opportunities provided.
- Visitor Impacts-the degree of impact on both the attributes of the setting and other visitors within the setting.

Based on these seven elements, the Forest Service assigns one of seven ROS settings to all land that it manages. These settings, which range from "primitive" to "urban", are detailed in the Forest Plan and summarized below:

Primitive: An essentially unmodified natural environment of fairly large size. Interaction between users is very low and evidence of other users is minimal. Motorized use is rare.

Semi-Primitive Non-motorized: A natural or natural-appearing environment of moderate to large size. Interaction between users is low, but there is often evidence of other users. No roads are present.

Semi-Primitive Motorized: A natural or natural-appearing environment of moderate to large size. Interaction between users is low, but there is often evidence of other users. Local roads may be present.

Roaded Natural: Resource modification and utilization are evident within a predominately natural appearing environment. Interaction between users may be moderate to high. Conventional motorized use is provided for in construction standards and design of facilities.

Roaded Modified: Vegetative and landform alterations typically dominate the landscape. Sights and sounds of humans, including roads and/or highways, are readily evident. Interaction between users may be low to moderate.

Rural: A substantially modified environment. Sights and sounds of humans are readily evident and the interaction between users is often moderate to high. A considerable number of facilities are designed for use by a large number of people. Facilities for intensive motorized use and parking are available.

Urban: Urbanized environment with dominant structures, traffic lights, paved streets, and other developments.

Project Area ROS Settings: All ROS settings with the exception of "urban" are found within the general project area (Figure 3-4). Those settings located on National Forest System lands and potentially affected by road reconstruction are described below:

A moderately sized area along the coast of Clarence Strait is within the Semi-Primitive Motorized ROS setting. This setting is part of the Ratz (a.k.a. Baird Peak) roadless area.

The Roaded Natural ROS setting is found in small, isolated areas along the shoreline of Clarence Strait.

The majority of the project area is within the Roaded Modified (RM) ROS setting. Virtually all project lands between Thorne Bay and Sal Creek back from the shoreline of Clarence Strait, including those lands adjacent to NFSR 30, are within this setting. Large quantities of land in the center and north end of the Project area, including those lands adjacent to NFSR 30 and NFSR 3030, are also within the RM setting.

Recreation Places and Recreation Sites

As defined in the Forest Plan, "Recreation Places" are identified geographical areas of small to moderate size that have physical characteristics that are attractive to people engaging in recreational activities. These places may include beaches, streams, lakes, road access, cabins, shelters, and campgrounds.

"Recreation Places Important to Tourism", as defined in the Forest Plan, are places important for commercial recreation and tourism. These areas are of value to the local and regional economy. They include areas used by outfitters and guides, resorts, charter boat operations, and bus lines. They also include the opportunities and attractions identified in local and regional tourism brochures.

Recreation Sites are specific locations where recreational activities are known to occur and/or where recreational facilities are located. A Recreation Place may contain from zero to several Recreation Sites.

Existing Project Area Recreation Places and Sites: Recreation Places are found throughout the Project area (Figure 3-5). Among the areas with Recreation Place designation are Thorne Bay, Coffman Cove, much of the Clarence Strait coastline, Slide Creek and Salamander Lake, Luck Lake and Eagle Creek, areas between Luck Lake and Sweetwater Lake, the Thorne River/Honker Divide Canoe Route (Sweetwater Lake, Hatchery Lake, and Butterfly Lake), and Baird Peak.

Those Recreation Places at the mouth of Hatchery Creek, in the Thorne River/Honker Divide Canoe Route south of the Hatchery Creek Bridge, at Ratz Harbor, and at Little Ratz Harbor are designated as being "Important to Tourism".

The Project vicinity contains 42 identified Recreation Sites (Figure 3-5). These Recreation Sites, which include developed and dispersed (largely undeveloped) sites, are most prevalent along the Clarence Strait shoreline and in the Thorne River/Honker Divide Canoe Route. Several anchorages are located along protected portions of the Clarence Strait shoreline. Other Recreation Sites are located near Big Lake, Baird Peak, and Luck Lake. As identified in Table 3-4 and described below, 28 of these Recreation Sites are potentially affected by the reconstruction of the Sandy Beach Road.

Sandy Beach Road Project
Recreation Opportunity Spectrum

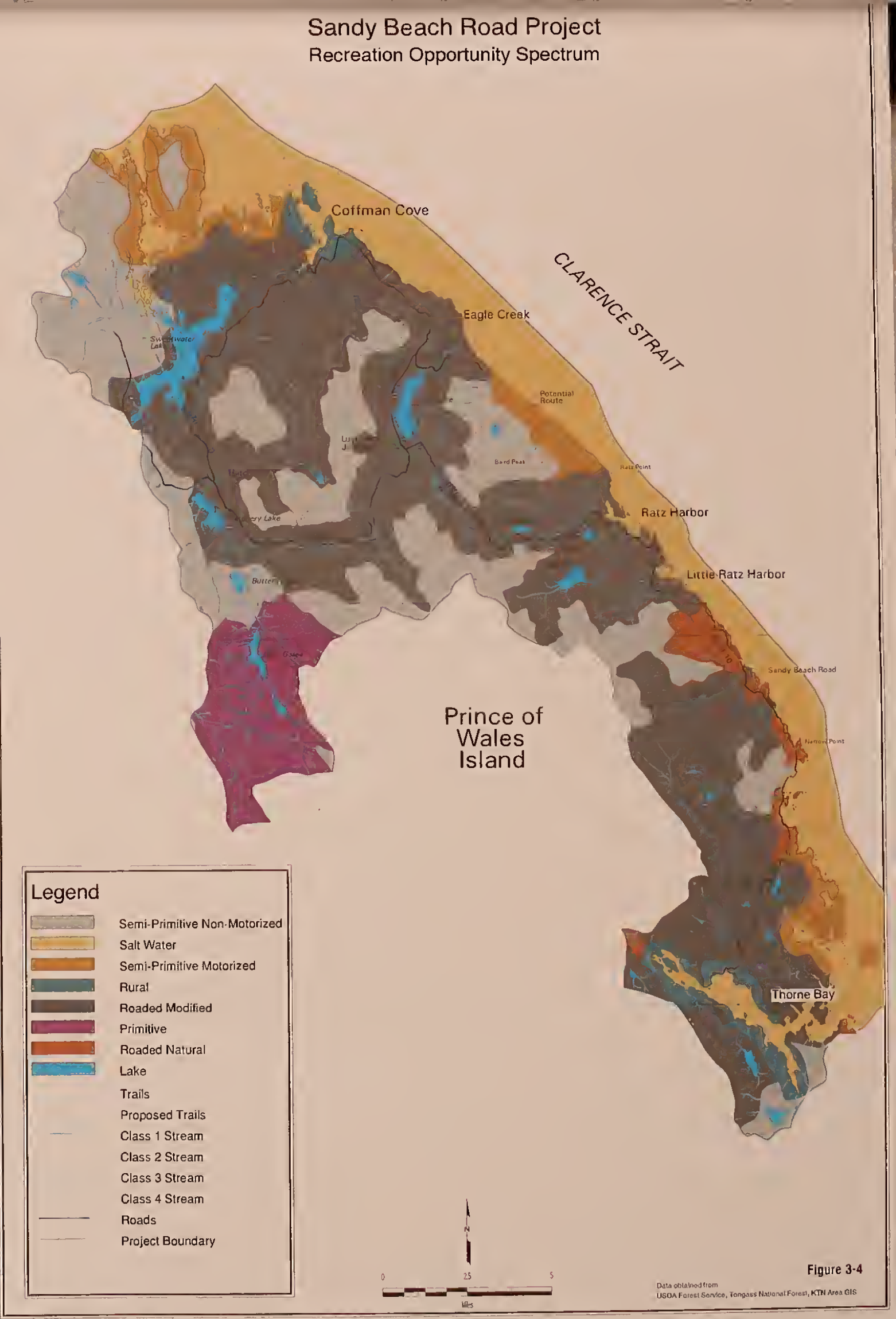
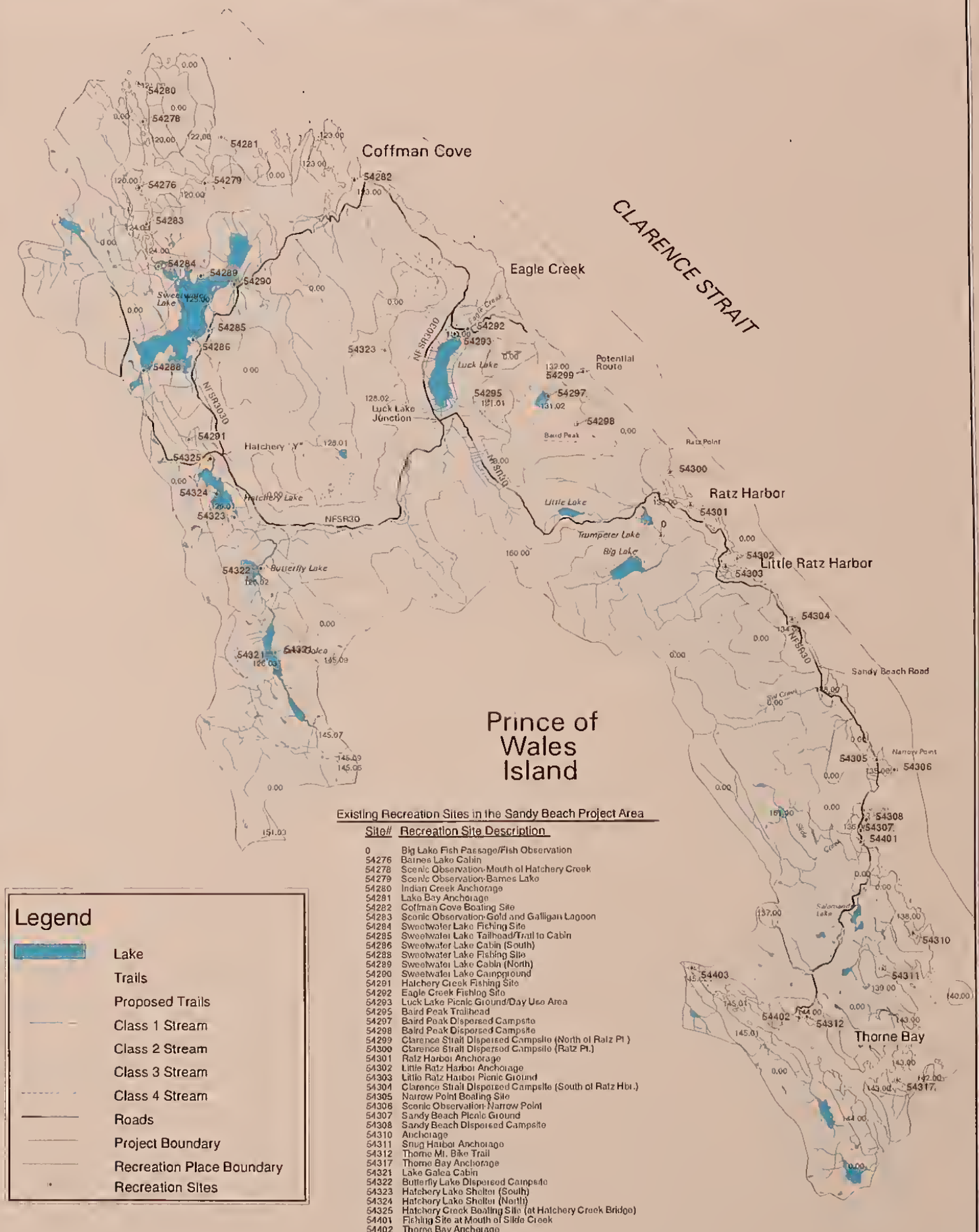


Figure 3-4

Data obtained from
USDA Forest Service, Tongass National Forest, KTN Area GIS

Sandy Beach Road Project

Recreation Places and Recreation Sites



Existing Recreation Sites in the Sandy Beach Project Area

Site#	Recreation Site Description
0	Big Lake Fish Passage/Fish Observation
54276	Barnes Lake Cabin
54278	Scenic Observation-Mouth of Hatchery Creek
54279	Scenic Observation-Barnes Lake
54280	Indian Creek Anchorage
54281	Lake Bay Anchorage
54282	Coffman Cove Boating Site
54283	Scenic Observation-Gold and Galligan Lagoon
54284	Sweetwater Lake Fishing Site
54285	Sweetwater Lake Trailhead/Trail to Cabin
54286	Sweetwater Lake Cabin (South)
54288	Sweetwater Lake Fishing Site
54289	Sweetwater Lake Cabin (North)
54290	Sweetwater Lake Campground
54291	Hatchery Creek Fishing Site
54292	Eagle Creek Fishing Site
54293	Luck Lake Picnic Ground/Day Use Area
54295	Baird Peak Trailhead
54297	Baird Peak Dispersed Campsite
54298	Baird Peak Dispersed Campsite
54299	Clarence Strait Dispersed Campsite (North of Ratz Pt.)
54300	Clarence Strait Dispersed Campsite (Ratz Pt.)
54301	Ratz Harbor Anchorage
54302	Little Ratz Harbor Anchorage
54303	Little Ratz Harbor Picnic Ground
54304	Clarence Strait Dispersed Campsite (South of Ratz Hbr.)
54305	Narrow Point Boating Site
54306	Scenic Observation-Narrow Point
54307	Sandy Beach Picnic Ground
54308	Sandy Beach Dispersed Campsite
54310	Anchorage
54311	Snug Harbor Anchorage
54312	Thorne Mt. Bike Trail
54317	Thorne Bay Anchorage
54321	Lake Galea Cabin
54322	Butterfly Lake Dispersed Campsite
54323	Hatchery Lake Shelter (South)
54324	Hatchery Lake Shelter (North)
54325	Hatchery Creek Boating Site (at Hatchery Creek Bridge)
54401	Fishing Site at Mouth of Silde Creek
54402	Thorne Bay Anchorage
54403	Picnic Area

Legend

- Lake
- Trails
- Proposed Trails
- Class 1 Stream
- Class 2 Stream
- Class 3 Stream
- Class 4 Stream
- Roads
- Project Boundary
- Recreation Place Boundary
- Recreation Sites

N

0 2.5 5

Miles

Figure 3-5

Data obtained from
USDA Forest Service, Tongass National Forest, K1N Area GIS

Table 3-4. Existing Recreation Sites Potentially Affected by the Sandy Beach Road Project.

Recreation Site Number	Recreation Site Description
0	Big Lake Fish Passage/Fish Observation
54282	Coffman Cove Boating Site
54285	Sweetwater Lake Trailhead/trail to Cabin
54286	Sweetwater Lake Cabin (south)
54289	Sweetwater Lake Cabin (north)
54290	Sweetwater Lake Campground
54291	Hatchery Creek Fishing Site
54292	Eagle Creek Fishing Site
54293	Luck Lake Picnic Ground/Day Use Area
54295	Baird Peak Trailhead
54297	Baird Peak Dispersed Campsite
54298	Baird Peak Dispersed Campsite
54299	Clarence Strait Dispersed Campsite (north of Ratz Point)
54300	Clarence Strait Dispersed Campsite (Ratz Point)
54301	Ratz Harbor Anchorage
54302	Little Ratz Harbor Anchorage
54303	Little Ratz Harbor Picnic Ground
54304	Clarence Strait Dispersed Campsite (south of Ratz Harbor)
54305	Narrow Point Boating Site
54306	Scenic Observation-Narrow Point
54307	Sandy Beach Picnic Ground
54308	Sandy Beach Dispersed Campsite
54312	Thorne Mountain Bike Trail
54323	Hatchery Lake Shelter (south)
54324	Hatchery Lake Shelter (north)
54325	Hatchery Creek Boating Site (at Hatchery Creek Bridge)
54401	Fishing Site at mouth of Slide Creek
54402	Thorne Bay Anchorage

Potential Project Area Recreation Enhancements: Several potential recreation enhancements have been identified within the Project area. These potential enhancements, which have not been prioritized, are described below (in no particular order).

Ratz Harbor Campground and Day Use Area - This project is currently on the Capital Improvement Projects (CIP) list for funding. It involves construction of a small 4-unit campground (Proposed Recreation Site 897) and day-use area (Proposed Recreation Site 898) at Little Ratz Harbor. The camp units will consist of a 16' x 20' tent platform, picnic tables and fire rings. Additional elements include a 2-hole SST, 550 linear feet of boardwalk trail and an accompanying day-use area. The day-use area is located on a knob overlooking the ocean while the campground is located along the beach. These two sites are separated by an existing spur-road. A gravel trail will be built to connect the two sites. The day-use area contains a 16' x 20' shelter with 2 picnic tables, a community fire ring and BBQ grills. Additionally, 3 picnic tables will be dispersed from the day-use site. The campground and day-use area are each ½-acre in size. Parking areas, signs and a kiosk will also be constructed.

Big Lake-Trumpeter Lake Trail Complex and Shelter - Components of this project include: building a gravel trail along NFSR 3023500 into Big Lake from the Sandy Beach Road; building a boardwalk trail over a muskeg from the Big Lake fish viewing area to Big Lake; building a trail from Big Lake to Trumpeter Lake using existing road beds; and constructing a shelter (Proposed Recreation Site 899) at Big Lake. More field reconnaissance is needed prior to developing these facilities.

Luck Lake Day Use Area - This project is currently on the CIP list for funding. It involves construction and rehabilitation of the existing Luck Lake Day Use Area (Recreation Site 54293) including redesign of the parking area and construction of a 16' x 20' shelter, community fire ring and picnic tables. Three dispersed sites with picnic tables, small grills, and fire rings will be constructed, as well as a 2-hole SST, kiosk and signage (Proposed Recreation Site 896).

Sandy Beach Road Sea Mammal Interpretive Trails - This project involves building a number of short interpretive trails along the Sandy Beach Road to Ratz Harbor. Each trail would begin on the Sandy Beach Road and end at the ocean with a viewing deck and high quality interpretive signs. Each short trail would have a sea mammal theme. For example, the Orca Trail would have interpretation on Orcas; The Sea Otter Trail on sea otters, etc. Parking areas would be needed. A road guide could be developed for the trail system. Each trailhead would have a common logo sign to identify that it is one of the Sea Mammal Trails.

Handicap Accessible Cabin at Big Lake - Construct a fully accessible cabin on the Thorne Bay Ranger District. The location is yet to be determined. Other possible sites include Control Lake and the small islands near Thorne Bay or Whale Pass.

Baird Peak Trails - Build a trail from NFSR 30310 to Baird Peak and connect to NFSR 3026.

Thorne River Corridor Development Plan - During the interim between nomination and potential designation, the Thorne River must be managed as if it were a Wild and Scenic River. There must be no degradation of the outstandingly remarkable qualities that qualified this river for nomination during the designation process. A holistic development plan will determine what uses are appropriate, and identify appropriate locations for facilities. Goals of this plan will include determining carrying capacity of the river and development criteria for potential recreation projects.

In addition to new projects, the Forest Service has also generated a list of improvement projects for existing recreational trails and cabins. Improvement projects relevant to the Sandy Beach Road Project are shown below in no particular order:

- Hatchery Creek (Recreation Site 54325) Trail - boardwalk over existing muddy trail through muskeg (on-going)
- Sandy Beach Picnic Ground (Recreation Site 54307) - redesign and rehabilitate
- Big Lake Viewing Area - improve parking and trail
- Honker Divide Canoe Route - leave as primitive, challenging experience but need to consider hardening in muskegs, as resource damage is occurring

Existing and Potential Activities and Use Patterns: The Project area offers opportunities for most of the outdoor recreation activities popular in Southeast Alaska. The Alaska Statewide Comprehensive Outdoor Recreation Plan (SCORP) lists the five most popular outdoor recreational activities for Southeast Alaska residents as motor boating, walking or running, fishing, driving for pleasure, and bicycling (ADNR no date). The Forest Service's annual estimate of recreational use within the Thorne Bay Ranger District indicates that the five most popular activities are viewing scenery, automobile travel, motor boating, saltwater fishing, and big game hunting. Participation in each of these activities occurs within the Project area.

Although there are no figures available for the actual amount of recreation use within the Project area, the Thorne Bay Ranger District's annual tally of use allows for some inferences. An estimated 194,300 Recreation Visitor Days (RVD, a measure of recreation use where one RVD consists of recreation use of a site or area by one person for 12 hours) occurred within the District during 1992. Mechanized travel and sightseeing, the most popular activities identified, generated an estimated 101,400 RVD's, or 52 percent of the District's total (USDA Forest Service 1995).

Prince of Wales Island's road system makes motor vehicle travel popular among residents and visitors. During Project scoping, it was noted that some people enjoy the narrow and winding "forest road experience" encountered on the existing Sandy Beach Road. The Thorne Bay Ranger District ranked mechanized travel and viewing scenery as the most popular form of outdoor recreational activity in the District. Automobile travel

was the most popular form of such travel, accounting for 32 percent of all RVDs. An estimated 9 percent of RVDs were devoted to sightseeing and 4 percent to powerboating (USFS 1995).

The existing Sandy Beach Road is relatively popular with motorists driving for pleasure. The proximity of the existing Sandy Beach Road to Clarence Strait, between Slide Creek and Ratz Harbor, may be largely responsible for this popularity.

Boating, which may also be considered mechanized travel, is also a very popular activity on Prince of Wales Island. Motorboats are commonly used to access the coastal parts of the Project area for recreational activities such as fishing, hunting, gathering activities, and viewing scenery. Anchorage areas, the use of which is difficult to estimate, occur in several scenic locations along the Clarence Strait coastline. Those anchorage areas potentially affected by reconstruction of the Sandy Beach Road are shown in Table 3-4. The effects of the Project on users of these anchorages would generally be minimal, except during construction. However, some users may object to the changes in visual character and decrease in remoteness.

An estimated 39,000 RVDs (14 percent of the District's total RVDs) were devoted to recreational hunting and fishing in 1992. The island's reputation for excellent fishing is widespread. Some consider it the best steelhead fishing location in North America (Batin 1992, in USDA Forest Service 1995), with availability peaking in early spring and early winter. The Project area also supports anadromous species such as pink, chum, coho, and sockeye salmon; rainbow and cutthroat trout; and one species of char (Dolly Varden). The Forest Service (1995) estimated that 16,500 RVDs (8.5 percent of total RVDs) were associated with fishing activities in the Thorne Bay Ranger District. Although the number of anglers is relatively low compared to other areas of Alaska, these numbers are increasing (Mills 1990, in USDA Forest Service 1995).

Forest Service estimates show approximately 10,900 RVDs (6 percent of the total) devoted to hunting big game, small game, upland birds, and waterfowl in the Thorne Bay Ranger District in 1991. Big game hunting, mostly for Sitka black-tailed deer, was the most popular type of hunting (approximately 6,200 RVDs).

Hiking and walking in the Thorne Bay Ranger District accounted for an estimated 3,100 RVDs or 1.6 percent of the total. Little hiking and walking took place within the Project area, however, as few trails are located here.

Canoeing and kayaking (non-mechanized water travel) on fresh and salt water accounted for approximately 1,300 RVDs (less than one percent of the total). An estimated 360 RVDs occurred within the Thorne River/Honker Divide Canoe Route.

Commercial Outfitters and Special Recreation Use Permits: Some recreationists who fish in the Project Area use commercial outfitters and guides to take them to productive saltwater and freshwater fishing locations. Although little information concerning the intensity of commercial outfitter and guide use exists, it is reasonable to assume that they use areas popular with recreational anglers. In 2001 there are 53 permittees (fishing,

hunting, and non-consumptive use) on Prince of Wales Island. Twenty-one of these permittees outfit or guide exclusively on the island, while 32 offer their services off-island. Sixteen permittees are authorized to use the Thorne River (P. Woodworth, personal communication, USDA Forest Service, 2001). The Ketchikan Area Office of the Tongass National Forest completed an Environmental Assessment of outfitter and guide use of freshwater systems on Prince of Wales Island. This assessment revealed that three outfitter/guide permits were requested for the North Thorne River in 1992 and that nine such permits were requested for the Thorne River as a whole. The same assessment revealed that the number of customers being taken to fish at these locations has increased (USDA Forest Service 1995).

Wild, Scenic, and Recreation Rivers: The 42-mile long Thorne River and Hatchery Creek system, also known as the Honker Divide Canoe Route, has nationally significant fisheries, wildlife, recreation, and scenic values. The northern portion of the Route, between Lake Galea and saltwater (including Lake Galea, Butterfly Lake, Hatchery Lake, Sweetwater Lake, and Barnes Lake) is within the Project area, as is the extreme southern portion surrounding Thorne Bay. Project lands south of the Hatchery Creek (FH 44) Bridge have been determined to be suitable for Scenic River designation. Those lands north of the Hatchery Creek Bridge and in the vicinity of Thorne Bay are recommended for designation as a recreational river to allow for the development of public recreation facilities and to enhance public access to the river system (USDA Forest Service 1999b).

Roadless Areas: The Ratz roadless area (#512), which is also referred to as the "Baird Peak Area", is located in the east-central portion of the Project area, between Luck Lake and Ratz Harbor. The area is characterized by very rugged terrain except for the uplands west of Ratz Harbor where the topography is flat and wetlands and muskeg prevalent. The area is 5,184 acres in size, all of which lies within the Project area. It is bounded by roads and timber harvest units on the north, west, and south; and by Clarence Strait on the east. The major scenic features are the diverse alpine terrain and small lakes near the summit of Baird Peak. Relative to other areas of Prince of Wales Island, this area is heavily used. It is a primary subsistence area for residents of Coffman Cove. It is also used to a lesser extent for recreation and subsistence by residents of Thorne Bay. The area also provides a large block of unaltered habitat for many wildlife species. The Ratz roadless area has been unaltered by human activity, but due to the extensive timber harvest around the periphery the natural integrity is fair. Except where logging occurs, opportunities for solitude are good (USDA Forest Service 2000a).

Wilderness: No designated wilderness areas are located in the vicinity of the Project.

Effects of the Alternatives

Recreation Access and Opportunities

Effects on recreation access and opportunities would result from road reconstruction and/or construction. These effects are quantified below in terms of ROS settings; Recreation Places and Sites; Wild, Scenic, and Recreation Rivers; and Roadless Areas. Some effects would be long term in nature, while others would be temporary. Effects on

recreation would be most pronounced during construction. Construction activities would temporarily disrupt or prohibit access to popular Recreation Places and Sites, as well as detouring traffic through or near Recreation Places and Sites that would otherwise be rarely visited. Construction zone delays, which may be an hour or more (USDOT 2000) would inconvenience and/or deter recreationists using the existing roadways. Noise from construction activities would temporarily decrease the experience of solitude in adjacent Recreation Places and Sites.

Alternative 2 would result in a paved two-lane roadway between Thorne Bay and Coffman Cove. Such a roadway would be ideal for recreationists accessing the Project area by automobile, but the route would be less direct than that proposed in Alternatives 3, 4, or 5. The "forest road experience" enjoyed by some users of the existing roadway would be lost en route. It should be noted that many other one-lane gravel roads would be available for recreational driving within the Project area. This route would also traverse areas of relatively high elevation and may not be passable year-round unless maintained by snow removal equipment.

Alternative 3 would result in a roadway between Thorne Bay and Coffman Cove that contains sections that are paved two-lane and paved one-lane with inter-visible turnouts. The sections that are one-lane paved with inter-visible turnouts would be less suitable for recreational travel than those that are paved two-lane. These sections would, however, retain the "forest road experience". This route would also traverse areas of relatively high elevation and may not be passable year-round due to snow accumulations, unless plowed.

Alternative 4 would result in a roadway between Thorne Bay and Coffman Cove containing sections of paved two-lane and gravel one-lane roads with inter-visible turnouts. The sections that are one-lane gravel with inter-visible turnouts would be less suitable for recreational travel than those that are paved one-lane with inter-visible turnouts and paved two-lane. These one-lane gravel sections would retain the "forest road experience". This route would also traverse areas of relatively high elevation and may not be passable year-round unless maintained by snow removal equipment.

Alternative 5 would result in a roadway between Thorne Bay and Coffman Cove that is more direct than that in Alternatives 2, 3, or 4. This roadway, which would consist of sections that are two-lane gravel and one-lane gravel with inter-visible turnouts, would be less suitable for recreational travel than those in the other alternatives. The new section of one-lane gravel road would increase the amount of "forest road experience" available within the Project area. Such a direct route between Thorne Bay and Coffman Cove would expose recreationists to fewer of the Project area's landscape types and recreational opportunities. Because the new section of road would parallel Clarence Strait, however, driving for pleasure would likely increase.

Use of existing recreation sites located along or in the vicinity of the road segments to be rebuilt/built would likely increase as a result of Project implementation. Increases in use would likely be highest at sites immediately adjacent to these road segments.

Overcrowding, which may occur at some sites, could displace existing users that desire few social interactions.

Each action alternative would enhance recreational opportunities within the Project area. These enhancements would take place in the vicinity of road segments to be upgraded (Alternative 2, 3, 4, or 5) or constructed (Alternative 5). Following the completion of improvements, access to existing and proposed recreational areas in the vicinity would improve. Proposed road improvements would also facilitate driving for pleasure (a recreation opportunity) on this portion of the island.

Project Area ROS Settings

Alternative 1 (the No Action Alternative) would have no effect on Project area ROS settings.

Alternatives 2, 3, and 4 would upgrade existing routes between Thorne Bay and the Coffman Cove Road. In areas to be widened, the roadway would become a more prominent feature of the landscape and include guardrails, ditch lines, and larger roadside clearings. In areas to be paved the roadway would have crisper geometric features, linear foglines and centerlines, guardrails, ditch lines, and larger roadside clearings. As seen in the middleground and background, the darkly colored asphalt surface would blend into its surroundings better than the lightly colored gravel surface. These developments, in conjunction with the proposed recreational enhancements, would have no effects on the ROS settings along the routes, even in the more restrictive areas of Roaded Natural ROS that are found between Salamander Lake and Little Ratz Harbor. The remainder of the routes, which also include recreational enhancements, would have no effect on areas of Roaded Modified ROS.

Alternative 5 would construct a new, one-lane gravel road with inter-visible turnouts along the shoreline of Clarence Strait from Ratz Harbor to Eagle Creek. It would also construct several recreation developments along this same stretch of shoreline, increasing access and interactions between users. Much of this area has an ROS setting of Semi-Primitive Motorized. Construction of this new road segment and associated recreation developments would change this Semi-Primitive Motorized setting to Roaded Natural.

Project Area Recreation Places and Sites

Alternatives 1, 2, 3, or 4 would have little effect on recreation places within the Project area, although improved road access and recreation enhancements (Alternatives 2, 3, or 4) may encourage increased use. The increase in use may be most noticeable within recreation places that are deemed "important to tourism", such as Ratz Harbor, Little Ratz Harbor, Luck Lake, and Eagle Creek.

Alternative 5 would construct a new road and several recreation developments through the Clarence Strait portion of the Ratz roadless area/Baird Peak Recreation Place. Changes in the ROS setting (Semi-Primitive Motorized to Roaded Natural) would likely displace users seeking natural appearing environments and low levels of interaction with other users.

Recreation enhancements associated with each of the action alternatives are shown on Figures 2-2, 2-3, 2-4, and 2-5 and described in Table 3-5. These proposed enhancements are made up of all the potential recreation enhancements (Table 3-5) in areas where road upgrades or construction are to take place. All action alternatives (2, 3, 4, or 5) would result in increased recreational access to the Project area and increased developed recreation opportunities. Alternatives 1, 2, 3, 4, or 5 would provide 0, 6, 3, 3, or 7 general recreation developments, respectively. It should be noted that some of these general developments would include work at more than one geographic location.

Table 3-5. Recreation Enhancements by Alternative

Enhancement	Alternative				
	1	2	3	4	5
Construct small (4 unit) Ratz Harbor Campground (P-Rec Site 897) and Day Use Area (P-Rec Site 898). Enhance existing Ratz Harbor Day Use Area (Rec Site 54303).		X	X	X	X
Construct Sandy Beach Road Sea Mammal Interpretive Trails (no P-Rec Site #) with associated road turnouts between Thorne Bay and Ratz Harbor.		X			X
Construct Sandy Beach Road Sea Mammal Interpretive Trails (no P-Rec Site #) with associated road turnouts between Ratz Harbor and Eagle Creek.					X
Redesign and rehabilitate existing recreation sites along Sandy Beach Road between Thorne Bay and Ratz Harbor (Rec Sites 54304, 54305, 54306, 54307, 54308, 54401).		X	X	X	X
Construct Big Lake-Trumpeter Lake Trail Complex (no P-Rec Site #) and Shelter (P-Rec Site 899). Improve existing Big Lake viewing area and trail.		X			
Construct and rehabilitate existing Luck Lake Day Use Area (Rec Site 54293 and P-Rec Site 896).		X	X	X	X
Hatchery Creek trail improvements (Rec Site 54325).		X			
Construct 2 small (4 unit) campgrounds and day use areas in the vicinity of Rec Sites 54299 and 54300.					X
Construct Baird Peak Trail from NFSR 30310 to Baird Peak and connect to NFSR 3026.					X
TOTAL	0	6	3	3	7

Wild, Scenic, and Recreation Rivers: As the prescribed ROS settings and VQOs are achieved in areas of concern, the proposed alternatives would have no effect on the eligibility of the Thorne River and Hatchery Creek for Scenic and Recreation River designation.

Roadless Areas: Alternatives 1, 2, 3, or 4 would have no effect on identified roadless areas. Alternative 5 would construct a new, one-lane gravel road with inter-visible turnouts, along with various recreational enhancements, within the Ratz roadless area (#512). Such developments would decrease opportunities for solitude and could reduce

the size of area below the 5,000-acre threshold for consideration as an inventoried roadless area.

Cumulative Effects on Recreation Access and Opportunities

Cumulative effects on recreation access and opportunities, which are the result of collective past, present, and reasonably foreseeable future actions, include those generated by a proposed ferry terminal at Coffman Cove and other likely increases in recreational demand, roads and associated disturbance, recreation developments, and timber harvest.

Tourism in Southeast Alaska, including Prince of Wales, is increasing. The primary visitors to the island are sportfishing enthusiasts and independent recreationists (McDowell Group 1996 in USDOT 2000). Currently, tourism within the Project area is limited by its remote location, poor road conditions (safety, convenience, and quality of ride), and lack of supporting infrastructure.

The proposed improvement of the Sandy Beach Road, in conjunction with other road improvement, supporting infrastructure, recreation development projects on the island, increases in population and tourism, and the proposed ferry terminal at Coffman Cove, will likely result in a 200 percent increase in recreation demand within the Project area between 2001 and 2021. The expected increase in recreation demand is based on the assumption that recreation use is proportional to road use. ADT's in the general project area (Coffman Cove Road Corridor) were estimated in 1996 at 48, with a predicted increase to 120 ADT by 2021 or roughly an increase of 250 percent in 25 years (USDOT 2000). Therefore, for the 20 year period between 2001 and 2021 ADT's would be expected to increase by 200 percent and therefore, recreation use for the same period would also increase by 200 percent.

Alternative 1 would not upgrade the Sandy Beach Road or enhance recreational opportunities within the Project area. As recreation use and, therefore, vehicle counts, are expected to increase, especially with the addition of the ferry terminal at Coffman Cove, use of the existing road system will become increasing hazardous. Recreation facilities are also likely to become more crowded, unless additional opportunities are developed in a separate action. Crowding would decrease remoteness and increase social encounters at some recreation places and sites, resulting in a shift in ROS class from less developed to more developed (e.g., Roaded Natural to Roaded Modified).

Alternatives 2, 3, 4, or 5 would upgrade the Sandy Beach Road and enhance recreational opportunities. Such upgrades would allow the roadway to accommodate the increase in vehicle numbers expected to result from increases in population and tourism. Although recreation enhancements are included in Alternatives 2, 3, 4, or 5, road upgrades in conjunction with increases in resident population and tourism are likely to result in more crowding at recreation places and sites. This effect would likely be smaller in magnitude than under Alternative 1. A decrease in remoteness and an increase in social encounters could result in a shift in ROS class from less developed to more developed. By developing a recreational facility at Coffman Cove convenient for users of the proposed

ferry terminal, Alternatives 3 and 4 may be best able to handle the expected increase in recreation use generated by the proposed ferry terminal.

Access, remoteness, recreation development, and social encounter components of recreation opportunity would be altered by implementation of the action alternatives. However, over time the visual effects generated by the proposed roadways, road upgrades, and recreation facilities would diminish and the developments would blend into the surrounding landscape. Visual quality, which is also a component of recreation opportunity, would then be predominately affected by surrounding land use designations (LUDs). Landscapes seen from the affected roadways within LUDs that stress timber management, such as the Timber Management LUD, will continue to be visually disturbed, while those seen from LUDs that emphasize natural resources, such as the Old Growth Habitat LUD, will appear largely undisturbed.

Recreation Mitigation Measures

In addition to the recreational enhancements described above, which will mitigate for effects on recreation opportunities, places, and sites, the following measures are proposed:

- Provide information to tourists arriving on the island, directing them towards alternative recreational opportunities not affected by construction activities.
- Provide adequate signage to direct recreational user through construction areas to recreational facilities.
- Direct recreational users to alternate travel routes, if available.
- Provide an alternate access for periods when an existing access is unavailable.
- Locate construction-related developments and staging areas as far from recreational areas and facilities as feasible.

Issue 5 – Provide, maintain or improve fish passage at all crossings.
Existing Conditions

The Sandy Beach project area contains approximately 392 miles of streams. Streams on the Tongass National Forest are assigned a stream classification as outlined in the Forest Plan (Chapter 4). These stream classes identify fish use, i.e. Type I (anadromous), Type II (resident fish), Type III (perennial stream, no fish use), and Type IV (intermittent stream, > 1' width). Further, many of these streams have been assigned a USFS "channel type" classification using the criteria outlined in Paustian et al. (1992). Channel type characteristics are summarized in Table 3-6.

Table 3-6. Summary characteristics of the seven main channel process groups found within the project area (Paustian et al. 1992).

Process Group	Gradient	Dom. Substrate	Confinement	Stream Energy	Fish Use
Alluvial Fan (AF)	Low	Sand, Silt, Gravel	Unconfined	Low	Spawning/ rearing
Flood Plain (FP)	Low	Sand, Silt, Gravel	Low	Low	Spawning/ rearing
High Gradient, Contained (HC)	High	Cobble, Boulder	High	High	Limited rearing
Large Contained (LC)	Low-Mod	Gravel, Cobble, Boulder	Low to Moderate	Moderate	Spawning/ rearing
Moderate Gradient Contained (MC)	Mod-High	Cobble, Boulder, Bedrock	Moderate	Moderate to High	Some spawning; rearing
Moderate Gradient Mixed Control (MM)	Moderate	Gravel, Cobble, Boulder	Moderate	Moderate	Spawning, rearing
Palustrine (PA)	Very Low	Sand, Silt, Gravel	Unconfined	Low	Rearing

Many of these streams support resident and anadromous fish populations and abundant, high quality salmonid spawning and rearing habitat. Salmonids likely found within the project area include cutthroat trout (*Oncorhynchus clarki*) , Dolly Varden char (*Salvelinus malma*), coho salmon (*O. kisutch*), steelhead trout (*O. mykiss*), chum salmon (*O. keta*), pink salmon (*O. gorbuscha*), and sockeye salmon (*O. nerka*). Currently there are no known populations of federally listed threatened or endangered fish species in the project area.

Table 3-7. Miles of Streams by Channel Process Group and Road Segment within the Sandy Beach Project Area.

Process Group	Common route: Thorne Bay to Ratz Harbor	Ratz Harbor to Luck Lake Junction	Luck Lake Junction to Hatchery Y	Eagle Creek to Coffman Cove	Luck Lake Junction to Eagle Creek	Eagle Creek to 3030100	New Route: Ratz Harbor to Eagle Creek	Total	% of Total
Alluvial Fan (AF)	3.2 (2%)	3.7 (4%)	1.4 (4%)	0.2 <1%	2.9 (12%)	2.1 (20%)	0.2 (1%)	13.7	3%
Flood Plain (FP)	7.3 (4%)	4.8 (5%)	6.2 (16%)	0.0 (0%)	0.3 (1%)	0.0 (0%)	0.3 (1%)	18.9	5%
High Gradient, Contained (HC)	127.0 (71%)	61.4 (67%)	24.3 (65%)	20.9 (84%)	17.0 (74%)	7.6 (75%)	24.3 (96%)	282.5	72%
Large Contained (LC)	6.6 (4%)	5.5 (6%)	0.7 (2%)	0.3 (1%)	2.8 (12%)	0.0 (0%)	0.4 (2%)	16.3	4%
Moderate Gradient Contained (MC)	5.6 (3%)	4.4 (5%)	0.2 <1%	0.6 (2%)	0.0 (0%)	0.0 (0%)	0.0 (0%)	10.8	3%
Moderate Gradient Mixed Control (MM)	24.3 (13%)	10.5 (11%)	3.0 (8%)	2.7 (11%)	0.1 <1%	0.0 (0%)	0.0 (0%)	40.6	10%
Palustrine (PA)	4.7 (3%)	1.6 (2%)	1.7 (5%)	0.2 (1%)	0.0 (0%)	0.5 (5%)	0.1 <1%	8.8	2%
Total	179.4	91.9	37.5	24.9	23.1	10.2	25.4	392.4	100

Existing Stream Crossings: Road construction and use can pose risk to riparian and fisheries resources. Improper design, location, or construction techniques can result in the introduction of sediment into streams, affecting fish habitat at the point of entry and downstream (Murphy 1995). Normal downstream passage of sediment and organic debris can be affected by stream crossing structures, as can the upstream passage of both resident and anadromous fish. For these reasons, the location and design of stream crossings involves considerations of fisheries, riparian, soils, and water quality resources, as well as engineering feasibility.

The project area is well-roaded. The miles of road and the number of stream crossings under each alternative is presented in Table 3-8. The vast majority of road crossings occur over Class III and smaller streams.

The Forest Service and Alaska Department of Fish and Game are jointly surveying road culverts throughout the Tongass National Forest. Preliminary results by the ADFG indicate that as much as 80 percent of the culverts surveyed do not meet passage requirements (ADFG 2000b). The Forest Service results indicated as much as 33 percent of culverts in Class-I streams failed to meet passage requirements and 70 percent of the Class-II stream culverts failed passage requirements (USDA Forest Service 2000b). Miles of stream habitat located above treated road segments by alternative are summarized in Table 3-9.

Table 3-8. Number of stream crossings repaired or replaced under each alternative.

		Number of Stream Crossings Affected					
Alternatives	Reconst. Road (mi)	Class I	Class II	Class III	Class IV	Other	Total
Alternative 1	0	0	0	0	0	0	**0**
Alternative 2	36.8	22	25	50	19	105	**116**
Alternative 3	36.0	14	26	39	19	121	**219**
Alternative 4	36.0	14	26	39	19	121	**219**
Alternative 5	27.5	15	28	43	18	54	**158**

Table 3-9. Miles of stream located above replaced/ repaired stream structures, by alternative.

		Miles of Stream above Treated Road Crossings				
Alternatives	Reconst. Road (mi)	Class I	Class II	Class III	Class IV	Total
Alternative 1	0.0	0.0	0.0	0.0	0.0	**0.0**
Alternative 2	36.8	34.8	18.3	0.9	0.2	**54.2**
Alternative 3	36.0	37.4	22.5	0.8	0.8	**61.5**
Alternative 4	36.0	37.4	22.5	0.8	0.8	**61.5**
Alternative 5	27.5	28.1	16.7	3.8	0.2	**48.8**

Effects of the Alternatives

Road reconstruction, in particular widening the existing single-lane road will require the replacement of all stream-crossing structures, except existing 2-lane bridges. Following current design standards, fish passage through these upgraded structures would be guaranteed under all conditions.

New road construction in a previously roadless area could potentially impact fish passage at stream crossings.

Alternative 1 is the no-action alternative resulting in no new construction activities. The road system would remain as is; no culverts would be replaced, and any fish migration blockages in streams intersecting NFSR 30, NFSR 3030, and FR 3030100 would remain.

Alternative 2 proposes the widening and paving of approximately 36.8 miles of forest highway and the replacement of over 220 culverts, 47 of which intersect fish-bearing streams. Because this alternative proposes widening the road along the upgraded route, all existing culverts would be replaced, ensuring fish passage in streams along the route between Thorne Bay and the Hatchery Y.

Alternative 3 proposes the widening and paving of approximately 28.0 miles of existing roadway. An additional 8.0 miles of existing roadway would be paved, but would remain a single lane road. As many as 98 culverts could be replaced along NFSR 30 between

Thorne Bay and the Luck Lake Junction, including 30 culverts that intersect fish-bearing streams. As many as 73 culverts could be replaced along NFSR 3030, including 10 culverts that intersect fish-bearing streams, though because this section would be constructed to a single lane road standard, only those culverts deemed problems for passage would be replaced.

Alternative 4 proposes the widening and paving of approximately 24.3 miles of existing roadway. Approximately 132 culverts could be replaced along NFSR 30 near Sandy Beach and along NFSR 3030 near Coffman Cove, 29 of which intersect fish-bearing streams. An additional 11.6 miles of existing gravel roadway would be upgraded with inter-visible turnouts. As many as 97 culverts could be replaced along the upgraded section of NFSR 30 and NFSR 3030 (Ratz Harbor to Luck Lake Junction, and Luck Lake Junction to Eagle Creek), 11 of which intersect fish-bearing streams. Because these segments would remain as single-lane road, only culverts deemed problems for passage would be replaced.

The modified Alternative 4 (paving from Thorne Bay to the Sandy Beach Picnic Area and from Coffman Cove to the State land boundary; upgrade to two-lane gravel road to link the two segments via Luck Lake) would have similar effects as those described for Alternative 4. Due to the proposed widening of the roadway in the vicinity of Luck Lake, all culverts would be replaced, rather than just those needing repair.

Alternative 5 proposes the widening of approximately 27.5 miles of existing roadway. Approximately 132 culverts would be replaced along NFSR 30 near Sandy Beach and along NFSR 3030 near Coffman Cove, 29 of which intersect fish-bearing streams. The FR 3030100 would be upgraded with turnouts (3.2 miles) and a new single-lane forest road would be constructed from Eagle Creek to Ratz Harbor. Up to 9 culverts would be upgraded along the 3030100, 7 of which intersect fish-bearing waters. The proposed new road construction would intersect 17 stream channels, 7 of which are considered fish-bearing. Of the action alternatives, Alternative 5 would replace the fewest number of problem culverts, while Alternative 2 would remedy the greatest number. Alternatives 3 and 4 are intermediate in the restoration of passage within the project area.

Cumulative Effects

Forest roads constructed for timber harvest may continue to block fish movement upstream and downstream of stream intersections, blocking access to important spawning and rearing habitat. As road condition surveys are completed, these problem areas will be identified and future projects will incorporate the replacement or renovation of these road crossings to restore fish movement into upstream habitat.

Action Alternatives 2 through 5 will rectify this situation in varying degrees. Though some short-term adverse impacts associated with construction activities may occur, the long-term cumulative effect of the implementation of one of the action alternatives would be positive, in that previously inaccessible habitat would become accessible.

Mitigation Measures

Design of stream crossings identified as requiring compliance with fish passage regulations will be to the standards and guidelines specified in Alaska State Statue Title 16. Drainage structures meeting the criteria detailed in Title 16 include open bottom arches, slab bridges, and weir/baffle culverts.

Issue 6: Reduce sediment contribution into streams to protect water quality.

Road construction and use can pose a risk to riparian and fisheries resources. Improper design, location, or construction techniques can result in the introduction of sediment into streams, increase landsliding potential, and increase routing of sediment-laden water during periods of precipitation or snowmelt, affecting fish habitat at the point of entry and downstream (Murphy 1995). Normal downstream passage of sediment and organic debris can be affected by stream crossing structures. For these reasons, the location and design of stream crossings involves considerations of fisheries, riparian, soils, and water quality resources, as well as engineering feasibility.

Further, road surfacing material and construction determine the erodibility of the surface tread. Studies completed in forested watersheds in the Pacific Northwest (Reid, 1984) indicate that road surfacing material made of concrete or asphalt paving will reduce the erosion rate by 97 percent while road surfacing material made of gravel greater than six inches thick or gravel two to six inches thick will reduce the erosion rate by a factor of 80 and 50 percent, respectively. Thus, sediment delivery from paved roads would be far less than from roads surfaced with gravel.

Existing Conditions

More than 360 miles of gravel National Forest System Roads are located within the Sandy Beach project area. Many of these roads, with associated culverts and drainage systems, were constructed from ten to thirty years ago. With a lifespan of only twenty years, many of these stream structures are beginning to fail. Existing undersized culverts or poorly placed structures cause localized erosion within the channel or upslope. In some cases, mass slope failures initiate at a stream crossing.

Effects of the Alternatives

Soil disturbance associated with construction activities may increase sediment delivery to streams via stormwater runoff or from direct in-stream construction activities (i.e. culvert replacement).

Conversion of existing gravel roads to paved roads would reduce sediment inputs to streams by reducing road-surface erosion. Road-widening and paving would increase the amount of impervious surfaces, increasing water runoff during storms.

Proper culvert sizing and installation will minimize the risks of erosive events at each road crossing.

In Alternative 1, no new road construction or renovation would occur. No culverts would be replaced, sediment inputs from the existing roadway would remain the same,

and localized erosion from existing stream structures would remain unchanged. The No-Action alternative is presented as a baseline of comparison for the action alternatives.

Between 36-36.8 miles of roadway would be improved under each of Alternatives 2, 3, and 4. Alternative 5 would improve approximately 27.5 miles of existing road and construct an additional six miles of new road. Culvert replacement would be highest under Alternative 4 (229 culverts, 40 fish-bearing), followed by Alternative 2 (220 culverts, 47 fish-bearing) and Alternative 3 (171 culverts, 40 fish-bearing). Alternative 5 (158 culverts, 43 fish-bearing) results in the fewest culverts installed or replaced (Road Condition Survey database, USDA Forest Service 2001). No appreciable difference exists between Alternative 4 and Modified Alternative 4, except that the two-lane gravel option would slightly increase the potential for sediment delivery to streams.

Paving would be most extensive under Alternatives 2 and 3 (36.8 and 36.0, respectively), whereas Alternative 4 proposes 24.3 miles of paving. No paving would occur under Alternative 5.

Cumulative Effects

As presented in the Forest Plan FEIS, an Anadromous Fish Habitat Assessment (AFHA) Panel consisting of fish biologists and hydrologists analyzed effects of continued timber harvest and associated road building on Forest fisheries resources. The panel judged that even with the strictest protections, impacts to fish could still be relatively high in heavily impacted areas, due to cumulative effects. Roads were identified as the greatest impact, due to increased sediment yield, including yields from roads during construction, use during timber harvest activities, and lack of maintenance or proper closure following harvest activities (USDA Forest Service 1997).

Approximately 3,800 acres of suitable and available commercial forestland in the vicinity of the project area is scheduled to be harvested by 2154 (USDA Forest Service 2000a). Timber harvest and associated road building, especially in higher elevation areas within the project area, has the risk of increasing sediment delivery to stream channels. This in combination with past harvest and road construction results in adverse cumulative effects on fish and fish habitat. Mitigation measures reduce the likelihood of significant adverse impact, but future land management activity may still impact fisheries resources through increased run-off rates, clearing of vegetation, and increasing impervious surfaces.

Continued use of the existing road system, lack of road maintenance including the drainage system, and not properly storm-proofing abandoned roadways can lead to increased erosion rates, degraded road-drainage structures, and possible road washouts, all of which increase sediment delivery to streams.

Some portions of the project area are located on private lands. In past years, riparian harvest to the stream banks of fish bearing streams has taken place. Possible future timber harvest and road building on these hands has the potential to introduce sediment into fish bearing streams.

Other factors beyond timber harvest may contribute to declining salmon populations. Ocean conditions and survival, commercial, sport, and subsistence harvest, as well as land development all take a toll on fisheries resources and habitat.

Mitigation Measures

In all action alternatives, sediment impacts to fish during construction will be minimized through the use of BMP's as outlined in the Forest Service Handbook (FSH 2509.22). Examples include the use of silt fencing, routing of flows around construction zones, slope stabilization techniques (straw bales, straw or matting coverage of exposed surfaces), and timing restrictions in Class I, II, and III depending on proximity and effects of construction streams (typically during June, July, and August when adult salmon or incubating eggs are absent from the system).

Issue 7: Protect natural resource values in the roadless area

The only alternative that would affect the Ratz inventoried roadless area is Alternative 5. Under this alternative, a new road segment about 6 miles in length would be constructed at low elevation along the shoreline to link existing roads that currently end at Ratz Harbor on the south and near Eagle Creek on the north. Construction of the new road segment would require clearing and ground disturbance of approximately 138 acres.

The roadless area encompasses about 5,184 acres between Ratz Harbor and Eagle Creek. Land Use Designations classify 557 acres as Old-growth Habitat and 3,737 acres as Modified Landscape. A Transportation and Utility Systems LUD is located along the shoreline of the roadless area.

The terrain is rugged and primarily forested except near Ratz Harbor where the topography is flat and dominated by wetlands and muskeg. Alpine habitat and small lakes are present near the summit of Baird Peak, which reaches a little over 3,000 feet in elevation above mean sea level (msl). Lands to the south, west and north have been harvested extensively, but the habitat inside the roadless area is unaltered. The Clarence Strait forms the eastern boundary.

The sections below focus specifically on natural resources in the roadless area and the potential effects of Alternative 5. More general information about natural and social resources (e.g., subsistence, recreation, scenery) and the effects of other action alternatives are presented in a later section (Other Environmental Considerations) of this EA.

Geology, Karst and Soil Resources
Existing Conditions

The proposed road corridor is underlain by Silurian and Ordovician age sedimentary and volcanic rocks of the Alexander Terrain and Cretaceous granodiorite. The dominant rock types are andesite, greywacke, and granodiorite. Marble is found at high elevation west of the proposed road corridor on the west flank of Baird Peak but does not underlie the road corridor (USDA Forest Service 2000a).

Karst is a comprehensive term that applies to the unique topography, surface and subsurface drainage systems, and landforms that develop by the action of water on soluble rock – in the case of Southeast Alaska, limestone and marble. The dissolution of the rock results in the development of internal drainage, producing sinking streams, closed depressions, and other solutional landforms such as sinkholes, collapse channels and caves (White et al., in USDA Forest Service 2000a). Since no carbonate rocks are located along the proposed road corridor, no karst resources will be impacted.

The Forest Plan (USDA Forest Service 1997) constrains land-disturbing activities based on characteristics of soils stability. Characteristics include slope, drainage, bedrock characteristics, soil characteristics, existing landslides, and vegetation. The Forest Service uses a mass movement index (MMI) to indicate relative potential for mass movement. Slopes in excess of 72 percent are restricted from harvest unless an on-site analysis determines that potential impacts of accelerated erosion on down slope resources can be mitigated. In addition, road locations generally avoid slopes in excess of 67 percent, unstable slopes, or slide-prone areas.

A review of aerial photographs showing the northern and southern ends of proposed road corridor indicated no perceptible evidence of mass movement. The majority of the proposed road corridor will likely be constructed on a relatively level bench located below elevation 250 feet. With the exception of the northern portion of the road corridor, the majority of the slopes have a gradient of less than 67 percent. It should be noted that the location of road corridor depicted on the maps in this document is approximate.

Effects of the Alternative

Construction of the new road corridor in Alternative 5 would result in approximately 138 acres of disturbed soil. The majority of the road corridor would be constructed on a relatively level bench thereby reducing the risk of mass movement. The risk of mass movement would likely be higher along the northern portion where approximately 0.5 miles of the road corridor (not surveyed) traverses on steep slopes (72 percent), and approximately 2.5 acres of the road corridor is underlain by MMI 4 soils. However, during final design, it is likely that the alignment would be adjusted to avoid MMI 4 soils. There would likely be some sediment movement into the streams along the corridor during construction activities. Since the proposed road surfacing material would consist of gravel, some sediment movement into the streams will occur throughout the life of the road.

Cumulative Effects

If the road corridor is constructed, the Baird Peak inventoried roadless area will contain about six miles of road occupying approximately 138 acres.

Mitigation Measures

Soil resource protection prescriptions and landside mitigation measures would be developed for the road construction project. Standard Best Management Practices (BMP's) will be applied as described in the Region 10 Soil and Water Conservation

Handbook (FSH2509.22). The road reconstruction corridor would be eligible for random selection of BMP implementation monitoring.

Cut and fill slopes would be shaped to resemble natural slopes currently observed along the corridor. Exposed areas of fresh cuts and fills would be subject to wind and water erosion. These areas should be stabilized with a fast growing, non-aggressive seed mix. If available a native seed mix should be used. Expected impacts from erosion in the project area and proposed mitigation are discussed the water resources section of this chapter.

Fisheries and Water Resources
Existing Conditions

Fisheries: Approximately 96 percent of the stream habitat within this roadless area is classified as high-gradient, contained (HC) channel process group. The new road segment would intersect approximately 17 stream channels, seven of which are considered fish-bearing. Approximately 4 miles of Class I or II stream habitat occurs above the proposed route.

Water Quality: No water quality data are available for streams in this vicinity. In the absence of timber harvest, roads, or other development, baseline conditions are likely good.

Wetlands: Approximately 112 of the 138 acres of land within the proposed new road segment corridor are mapped as wetland, as shown in Table 3-10, below. Most wetlands along this corridor are forested wetland/emergent sedge complex. Only about 2 acres of bog/fen complex, considered a high value wetland, are present within the corridor.

Table 3-10. Wetland Types and Acreages within the new road segment corridor

Wetland Type	Wet-Hab Code	Acres
Bog/fen complex	EM	2.0
Forested wetland/emergent sedge complex	FES	21.2
Forested wetland/forested upland complex	FIC/FIW	3.5
Forested wetland/moss muskeg complex	FSS	5.3
Forested wetland	FW	79.5
Total wetland acreage		111.5

Effects of the Alternative

Fisheries: Impacts to fisheries commonly associated with roads include increased sediment yield to streams and altered water delivery to streams, and impaired fish passage due to culverts that are improperly sized, located or maintained.

Water Quality: Water quality impacts associated with new road construction center around sediment delivery to streams during construction. Because the proposed road surface would be gravel, sediment movement into streams would occur as a function of road use and road maintenance.

Wetlands: The high value bog/fen complex could likely be avoided by re-aligning the route during final design. However, due to the large acreage of other types of wetlands, complete avoidance of wetlands would not be possible. Up to 109 acres of wetlands could be affected, to some extent, by activities associated with road construction (e.g., excavation, fill, soil compaction, culvert placement). These activities have the potential to directly affect the size and characteristics of wetlands by blocking or altering inflow or outflow. The degree of impact would depend to a great extent on the type of wetland and the type of road construction selected.

Cumulative Effects

Cumulative effects of road construction through the Ratz roadless area would be minor, assuming that no other roads are built in this area. Although some wetland acreage would be lost as a result of road construction, cumulative effects would be minimized by implementation of Forest Service Standards and Guidelines, as described below.

An influx of sediment into streams as a result of road construction activities, or in the long term by improper maintenance of gravel surfaces, cutbanks and ditchlines, can have an adverse effect on water quality and fisheries. Cumulative effects would be minimized by implementing the Forest Service Standards and Guidelines, as described below.

Mitigation Measures

Implementation of Forest Service Standards and Guidelines and BMP's would minimize the risk of adverse effects on fisheries and water quality during construction. Bridge design with bumpers to prevent gravel from being pushed into streams during routine road maintenance would also help to prevent adverse impacts. Proper sizing, location, and maintenance of culverts would allow unimpeded movement of fish and other aquatic organisms.

Forest Service Standards and Guidelines for wetlands are consistent with Section 404 of the Clean Water Act, in first attempting to avoid impacts on wetlands wherever there is a practicable, environmentally preferred alternative. Where avoidance is not possible, Forest Service direction is to minimize impacts on wetlands and seek to maintain wetland functions and values. A wetland delineation and general assessment of functions and values will be conducted in the summer of 2001, prior to implementation of any alternative. Collection of site-specific data will be used to help ensure that the final layout of road and recreation projects for Alternative 5 do not adversely affect high quality wetlands and to avoid all wetlands where possible. Where wetland impacts cannot be avoided, clearing limits would be minimized. Properly-sized culverts and coarse rock roadbed would be used to help maintain the flow and reach of water that support wetlands. By minimizing the amount of side-ditching, effects on groundwater flow and soil moisture would also be minimized. The USFS will consult with other federal and state agencies to develop appropriate plan for wetland mitigation, where necessary, and will obtain applicable permits for work in wetlands prior to project implementation.

Wildlife

Existing Conditions

The Ratz roadless area contains over 5,000 acres of undeveloped, undisturbed habitat, including beach fringe; high volume, highly productive old-growth forest; wetlands, alpine meadows and lakes. It is one of few remaining large blocks of habitat on the east coast of North Prince of Wales Island.

Management Indicator Species (MIS) habitat capability models were not run for the Sandy Beach Project, since very small amounts of habitat would be affected by any of the action alternatives. However, the MIS concept was used to evaluate the effects of the proposed action on wildlife. Six MIS species were selected to represent animals that are sensitive to changes in road density or use, to activities conducted in old-growth, beach fringe, and riparian areas, or to other types of disturbance (e.g., recreation). These species include Sitka black-tailed deer, Alexander Archipelago wolf, black bear, river otter, marten, Vancouver Canada goose and bald eagle. Species/habitat relationships documented in the MIS models and other literature sources were used to help predict the impacts of the proposed action on wildlife. This information is presented below.

Sitka Black-Tailed Deer: The Sitka black-tailed deer is a habitat generalist that makes use of all major habitats of Southeast Alaska. Deer utilize all successional stages at all elevations, including alpine meadows and subalpine forests, for most of the year, but low elevation, high volume old-growth forests are needed to support deer populations during the winter (Hanley and Rose 1987; Yeo and Peek 1992). For this reason, the quantity of high quality winter range may be the most limiting habitat factor to deer.

Road density is also an important factor in evaluating deer habitat quality. Effects of roading include displacement of deer from preferred habitats due to increased disturbance, and over-harvesting of deer in localized areas adjacent to roads (Witmer et al. 1985). During the winter, habitat fragmentation into isolated stands of old growth concentrates deer in predictable areas, offering less security from wolves and hunters by reducing predator search time (Lemkuehl and Ruggiero 1991; USDA Forest Service 1991). Based on Forest GIS data, open road density within the project area is currently 1.56 miles per square mile.

Alexander Archipelago Gray Wolf: The Alexander Archipelago wolf, a subspecies of the gray wolf, occurs on the Southeast Alaska mainland and all large islands in Southeast Alaska except for Admiralty, Baranof, and Chicagof. It is a wide-ranging, opportunistic predator that does not exhibit a preference for specific habitats or habitat characteristics; the presence of wolves in an area appears to be most strongly related to deer habitat capability (Suring 1993; Person et al. 1996). Many studies have shown that wolf abundance is negatively correlated with road density (Theil 1985; Jensen et al. 1986; Mech et al. 1988; Fuller 1989). The primary threat of high road densities is the increased access for humans who kill wolves both legally and illegally by shooting, snaring, or trapping (Van Ballenberghe et al. 1975; Mech and Karns 1977; Person et al. 1996). Wolf harvest rates on Prince of Wales Island were noted to increase sharply in areas where

road densities exceed 0.49 miles per square mile (Person et al. 1996), and wolves are reportedly intolerant of road densities that exceed 0.7 miles per square mile (Fuller 1989; Mech 1989; Mech et al. 1988; Person et al. 1996).

Black Bear: Black bears range through all major habitat types found in the project area and require large expanses of habitat. Movements and distribution of black bears are primarily influenced by the availability of food and cover. Black bears are opportunistic omnivores that feed on new shoots and leaves, berries, and spawning salmon (late summer and fall). Estuarine, riparian, and forested coastal habitats receive the highest use by black bears and have the highest habitat values. Within forested areas, both early and late (old growth) successional stages provide the best forage and/or cover for black bears. Although many of their preferred foods grow best in openings, bears prefer not to move very far from cover when they are foraging; therefore large openings without cover are not utilized. Cover is also critical for denning sites.

Black bear populations are susceptible to overharvesting and may be negatively affected by increased human access to areas they use (Kolenosky and Strathearn 1987; Suring et al. 1988). Road construction increases the chances of human disturbance, which may result in the displacement of animals from their preferred habitats. An increase in road access may also result in a higher frequency of human encounters with bears. The Suring et al. black bear model (1988) uses a significant reduction factor when scoring for black bear habitat suitability when less than or equal to 2 miles from a road.

Marten: This member of the weasel family depends on mature and overmature forest stands with a canopy closure of greater than 40 percent, abundant downed logs and snags, and a lush understory to provide cover, denning and prey habitat (Strickland and Douglas 1987; Suring et al. 1988). Due to lower snow accumulation, habitats at lower elevations have higher value for wintering marten. High volume old growth coastal habitats (beach fringe) and riparian areas have the highest value. Marten are easily trapped, and populations are at risk of over-harvest in areas where road densities are high and trapping pressure is heavy (Warren 1990). As a result of this susceptibility to over-harvest, marten densities decrease when road densities exceed 0.2 miles per square mile, particularly in habitat in close proximity to beach fringe (Suring et al. 1988; Suring et al. 1992).

River Otter: River otters are associated with both coastal and fresh water aquatic environments and the adjacent (100 to 500 feet) upland habitats. High quality habitat occurs along the coast (beach fringe) and within riparian habitats along rivers, streams, and lakes up to 1,200 feet in elevation (Larsen 1984). Well-drained old-growth forests adjacent to water have the highest value, because they provide canopy cover, large diameter trees and snags, and availability of high quality burrow and natal denning sites. Lakes greater than 50 acres in size provide optimum foraging opportunities. Fish are the primary food source, with a minor component of marine invertebrates.

Habitat selection by river otters appears to be related to the availability of food resources and adequate cover. Otters select beaches characterized by convex shorelines, short

intertidal lengths, and a bedrock substrate based on the presence and availability of prey (Larsen 1984).

Vancouver Canada Goose: This subspecies of the Canada goose is relatively non-migratory, with the majority of birds moving only between local nesting, brooding, molting, and winter concentration areas (Lebeda and Ratti 1983). They use wetlands (both forested and non-forested) found in the estuary, riparian and upland areas of the forest. They are unique among all subspecies of Canada geese in that they use forested habitat for nesting and brood-rearing. High quality nesting and brood-rearing habitat is generally associated with low volume old growth on poorly drained soils, adjacent to small wetlands, lakes, and riparian areas, and adjacent to relatively dense forest habitats (Doyle et al. 1988). Beach fringe and estuary areas are extremely high-quality habitats for Vancouver Canada geese. Doyle et al. 1988 reports a negative correlation between goose abundance and roads.

Bald Eagle: Bald eagles are found throughout Southeast Alaska, primarily associated with coastal and inland riparian habitats. They are opportunistic in their use of food resources, with a dietary mainstay of fish (Kalmbach *et al.* 1964).

Bald eagles in Southeast Alaska prefer to nest adjacent to the coast, where they forage for fish, waterbirds, marine invertebrates, and drifting carrion. Nests are typically located in old-growth coniferous forests along the coastline and associated saltwater inlets. The majority of nests located have been in Sitka spruce trees, commonly on prominent points of land, small islands, and narrow passages. The GIS database for the project area shows 13 bald eagle nests along the shoreline within ¼ mile of the alignment for the new segment of Alternative 5.

Effects of the Alternative

Noise disturbance during construction: The effects of noise disturbance would vary from species to species. Many animals are fairly tolerant of noise, traffic, and construction activity, but timing restrictions would be needed to prevent adverse impacts to species that are sensitive to disturbance, including the MIS identified above. Timing restrictions would be especially important during spring and summer, when noise would have the potential to interrupt breeding and impair reproductive success. The need for timing restrictions would also be considered during the winter, if construction activities are planned at the time, since disturbance can increase thermal or energetic stress in some species, by displacing them from preferred cover or foraging areas.

Habitat loss: Approximately 138 acres of habitat would be removed in order to construct the new segment of road from Ratz Harbor to Eagle Creek under Alternative 5. Most of the approximately 6-mile long new segment would pass through beach fringe, which provides high-quality habitat for deer, wolves, black bear, marten, river otter, and Vancouver Canada goose, as described above. In addition to non-forested habitat and about 70 acres of medium and low volume low elevation old-growth forest, 20 acres of high volume, low elevation old-growth would be affected.

Habitat fragmentation: The Ratz roadless area contains one of the last intact large blocks of old growth with unobstructed beach fringe habitat on the east coast of North Prince of Wales Island. Construction of the new road segment would create an obstruction to animals moving between this block of old growth and other undisturbed habitat within the roadless area and high-quality beach fringe to the east. It would cut across seven streams that are mapped as fish-bearing streams. Each of these and ten smaller streams likely function as movement corridors for wildlife moving from higher elevations to the beach fringe. Each of the MIS discussed above would be affected by habitat fragmentation.

Increased road density, access and use: Under current conditions, open road density within the project area would increase from the current level of 1.56 miles per square mile to 1.59 miles per square mile. Road densities in the project area are already above the 0.7 mile per square mile threshold considered necessary to sustain viable populations of wolves (Person et al. 1996).

While the increase in density is small, the new road segment would provide access for motorized traffic, including cars, trucks, All Terrain Vehicles (ATV's) and snowmobiles. Increased accessibility to cars and trucks would increase traffic noise and increase the risk of collisions. More importantly, providing access to hunters (legal and illegal) and trappers would increase harvest pressure on several species, including Sitka black-tailed deer, black bear, marten, and Alexander Archipelago wolf. In most Game Management Units (GMU's) in Southeast Alaska, about 36 percent of hunting is conducted from vehicles, but in GMU 2, which includes the project area WAA's, 80 percent of the harvest comes from hunters using highway vehicles or ATV's as their main mode of transport (ADF&G 2000a).

Increased accessibility to hunters and trappers would affect subsistence resources, by increasing competition. This effect is discussed in more detail under Subsistence (Other Environmental Considerations), later in this chapter.

Accessibility for recreationists using ATV's and snowmobiles would affect wildlife in areas more remote from the road, as well. Disturbance in forest interiors and wetlands could jeopardize productivity during breeding, nesting and rearing; interfere with foraging; and increase stress on wintering animals by displacing them from stands that provide thermal cover.

Cumulative Effects

The direct loss of habitat that would result from construction of a road through the Ratz roadless area would be small. However, increased road density, access, hunting pressure, and recreation activity in one of the few remaining undisturbed blocks of habitat along the shoreline on North Prince of Wales would cumulatively affect wildlife on a project-wide basis, since it would add to the effects of other road improvements currently in the planning or implementation phases, or that may be needed within the next 25 years in order to meet anticipated demands associated with economic growth, tourism, and recreation. The road management program planned for the Luck Lake Project Area,

which overlaps the Sandy Beach Project Area to some extent, would help to moderate these effects. The intent of the road management program is to close 22.8 miles of currently open roads (USDA Forest Service 2000a).

Based on this evaluation, implementation of Alternative 5 would have significant effects on wildlife and subsistence resources. Selection of Alternative 5 as the preferred alternative would require preparation of an EIS to further investigate and quantify impacts on Sitka black-tailed deer and Alexander Archipelago wolf, in particular.

Mitigation Measures

Forest Service Standards and Guidelines recognize the importance of Beach and Estuary Fringe. Road construction is discouraged, but corridors may be designated where feasible alternatives are not available.

Forest Service Standards and Guidelines for Sitka black-tailed deer habitat center around identification of important winter range and interdisciplinary coordination. Measures such as slower speeds, signage, or longer sight distances may be needed to protect deer along the new road segment, particularly at sites where riparian corridors cross the road.

Standards and Guidelines for riparian areas and heron and raptor habitat should also be implemented along the new road segment. These measures will help to minimize adverse impacts on numerous wildlife species, in addition to the MIS described above.

Management of deer populations and human access are two important aspects of wolf management. Forest Service Standards and Guidelines indicate that deer habitat capability is to be maintained to support at least 13 deer per square mile. A 1,200-foot forested buffer is to be maintained around active dens, and road construction within 600 feet of active dens is prohibited. These measures are not required for dens documented as inactive for 2 consecutive years, but surveys need to be conducted during the spring prior to implementation of potentially disturbing projects to determine whether inactive dens are again being used.

Bald eagle habitat is managed in accordance with the Interagency Agreement established with the USFWS to maintain long-term nesting, perching and winter roosting habitat capability. The new road segment would be aligned to avoid encroaching within 330 feet of any bald eagle nests. In addition, timing restrictions may apply between 1 March and 31 August for blasting and helicopter traffic.

Threatened, Endangered and Sensitive Species

Existing Conditions

Federally listed threatened and endangered species are those plants and animals listed by the U.S. Fish and Wildlife Service or National Marine Fisheries Service under authority of the Endangered Species Act of 1973, as amended. The State of Alaska also has an Endangered Species law, which authorizes the commissioner of the Alaska Department of Fish and Game to list Alaska species as endangered. Species may be designated by the Regional Forester as sensitive if a viability concern has been identified due to a predicted or documented downward trend in population or habitat, and where continued downward

trends may lead to local or Forest-wide extirpation, or to listing under the ESA, or both. The sections below describe existing conditions and potential project effects on fish, wildlife and plant species that are either federally listed or designated as sensitive species in Forest Service Region 10.

TES Fish Species: Information provided by the National Marine Fisheries Service (NMFS) indicates that no federally listed fish species are known to occur in the Project area (Letter from James W. Balsiger, NMFS, Administrator, Alaska Region to Eileen McLanahan, Harza Engineering, February 27, 2001). Although no anadromous fish species are listed as threatened or endangered in Alaska, anadromous fish-bearing streams provide essential fish habitat (EFH), as defined under the Magnuson-Steven Fishery Conservation and Management Act, for species managed by the North Pacific Fishery Management Council. These species include chum, chinook, coho, and pink salmon. EFH is defined as aquatic areas (including the water and substrate) needed to support a sustainable fishery and promote the managed species' contribution to a healthy ecosystem. The EFH for this project includes all segments of the streams and lakes where salmon reside during any period of the year. This includes all Type I stream and lake habitat within the project area.

TES Wildlife Species: Information provided by the U.S. Fish and Wildlife Service and NMFS indicates that no federally listed threatened or endangered animals are present in the project area (pers. comm., Teresa Woods, USFWS, Juneau, Ecological Services, February 15, 2001; letter from James W. Balsiger, NMFS, Administrator, Alaska Region to Eileen McLanahan, Harza Engineering, February 27, 2001). Two species listed as sensitive by the Regional Forester may occur in the Project area. These include the trumpeter swan and Queen Charlotte (northern) goshawk. Peale's peregrine falcon may also be present, but probably only incidentally. Peale's peregrine is known in Southeast Alaska only from the outer islands west of Prince of Wales Island, where they nest on cliffs in close proximity to large seabird colonies (Ambrose et al. 1988). Since no seabird colonies or cliffs are located in the project area, no impacts would be expected.

Trumpeter swan: Trumpeter swans breed in central and southern Alaska and along the Gulf coast, using forested wetlands, lakes, marshes and rivers bordered by dense vegetation (Groves et al. 1992). Trumpeter swans breeding in Alaska winter along the Pacific Coast from the Alaska Peninsula to the mouth of the Columbia River.

Trumpeter swans pass through the Project area during fall and early spring. They typically arrive in mid-October, overwintering in the Project area, and leaving for breeding grounds by mid-April. Swans have been observed regularly during the winter at Ratz Harbor, Luck Lake, Trumpeter Lake and Hatchery Lake. Surveys conducted in January of 2000 documented 25 swans on Luck Lake. No breeding has been documented on Prince of Wales Island.

Queen Charlotte goshawk: The Queen Charlotte goshawk is one of two subspecies of the northern goshawk in North America. A recent review of goshawk literature indicates goshawks are found primarily in productive old-growth forests and riparian areas on

gentle slopes at low elevation (Iverson et al. 1996). The Forest Plan defines high-value goshawk habitat as high-volume old growth below 1,000 feet on slopes less than 60 percent.

Quantitative data are insufficient to determine the abundance of goshawks in Southeast Alaska, but densities are generally thought to be low; the most recent estimates range from 100-800 pairs (Iverson et al. 1996). Since the first nest on the Tongass National Forest was documented in 1989, only 36 additional nests have been located on the Forest, despite fairly extensive survey efforts.

On the Thorne Bay Ranger District, possible goshawk use has been recorded in the Dog Creek drainage near Coffman Cove (possible wail calls, April 1999); along the NFSR 3030 Road about one mile southeast of Coffman Cove (possible visual sighting, June 1999); and east of Luck Lake (multiple sightings suggesting territorial defense behavior, breeding season 1999).

Plants: Eighteen plant species are listed as sensitive on the Tongass National Forest (USDA Forest Service 1999c). Forest Service sensitive species are those for which population viability is a concern (Tongass Land Management Plan, USDA Forest Service 1997). Of the eighteen sensitive species, ten may occur on the Sandy Beach Road Improvement project area. Table 3-11 presents a list of the sensitive species with potential to occur in the project area along with their habitat requirements and known occurrence information.

In accordance with the Endangered Species Act of 1973, as amended, the U.S. Fish and Wildlife Service (USFWS) maintains a list of federally threatened, endangered, proposed, and candidate species within the State of Alaska. The USFWS also monitors the occurrence of species of concern, plant species for which sufficient information is not available to support listing at this time. Review of the USFWS and Alaska Natural Heritage Program (AKNHP) database indicates that there are no listed threatened, endangered, or proposed, or candidate plant species in Southeast Alaska (USFWS 2000; AKNHP 2001). Three federal species of concern may occur in the project area (Table 3-11): ascending moonwort fern (*Botrychium ascendens*), super round wedge moonwort fern (unnamed *Botrychium* species), and smooth-fruited net-leaf willow (*Salix reticulata* spp. *glabellicarpa*).

The Forest Service also tracks the occurrence of plant species listed as rare by the State of Alaska. Review of this list indicates that no rare species are known to occur in the project area (AKNHP 2001). However, only portions of the project area have site specific inventories for these species at this time. Additional surveys will be done in the summer of 2001.

Table 3-11. Special Status Plant Species Known or Potentially Occurring in the Sandy Beach Road Project Area

Scientific Name / Common Name	Likelihood of Occurrence in Project Area	Habitats
Forest Service Sensitive Species		
Carex lenticularis var. dolia Goose-grass sedge	Unlikely	Alpine wet meadows, snowfield and glacier edges
Cirsium edule Edible thistle	Unlikely	Wet meadows and open woods along glacial streams; shallow freshwater, streams and lake margins
Glyceria leptostachya Davy mannagrass	May occur; known from Control Lake	Wet lowlands, shallow freshwater, stream and lake margins
Hymenophyllum wrightii Wright's filmy fern	May occur	Tree bases, rock outcrops with mosses in damp sites
Isoetes truncata Truncate quillwort	May occur	Shallow freshwater of lakes and streams
Ligusticum calderi Calder lovage	May occur; known from Prince of Wales	Subalpine and alpine meadows, rocky or boggy slopes, forest edge, typically on limestone
Platanthera gracilis Bog orchid	May occur; known from Dall Island	Wet open meadows
Poa laxiflora Loose-flowered bluegrass	May occur	Moist open lowland forests, open-forest meadows; also upper beach meadows
Romanzoffia unalaschensis Unalaska mist-maid	May occur; known from TBRD	Moist river banks and rock outcrops, beach terraces
Senecio moresbiensis Queen Charlotte butterweed	Documented in Project Area; NFSR 30 near Luck Lake	Montane to alpine wet areas, rocky heath, bogs, meadows;
USFWS Species of Concern		
Botrychium ascendens Ascending moonwort fern	May occur	Grassy meadows up to 8,000 feet elevation
Botrychium unnamed Super round wedge moonwort fern	Unknown	Unknown
Salix reticulata ssp. glabellicarpa Smooth-fruited net-leaf willow	Unlikely to occur	Various alpine habitats from 2,000 to 3,000 feet elevation

Sources: AKNHP 2001
Hulten 1968
Lipkin and Murray 1997
USDA Forest Service 1994
USDA Forest Service 1997b
USDA Forest Service 2000c
USDA Forest Service 2000d

Site specific surveys have been conducted in portions of the project area (USDA Forest Service 1999b and 2000a). These surveys documented the presence of Queen Charlotte butterweed along NFSR 30 between Luck Lake and the Hatchery Y. Additional Surveys

for sensitive and rare plants will be conducted on the remaining road segments during summer 2001.

Effects of the Alternative

TES Fish Species: Adverse effects to EFH would be minimal, as Forest Service Standards and Guidelines and BMP's would protect fish habitat during construction. Fish access to EFH would improve, since problem culverts would be replaced with properly functioning structures.

TES Wildlife Species: Construction of the segment of new road through the roadless area under Alternative 5 would not affect trumpeter swans, but could affect northern goshawk by removing approximately 91 acres of productive old-growth habitat. Noise disturbance during construction could also affect goshawks. Indirect effects could occur as a result of increases in recreation activity along the roadway and along the Baird Peak Trail under Alternative 5.

TES Plant Species: Additional biological studies and analysis would be required to adequately assess the effects the alternative has on TES plant species. As discussed above, surveys are planned for the summer of 2000.

Cumulative Effects

Habitat loss as a result of past, current and planned timber harvest would cumulatively affect the amount of suitable habitat available for northern goshawk.

Mitigation Measures

Project-level surveys for northern goshawk will be conducted and a Biological Evaluation will be prepared if the selected alternative affects potential habitat. Standards and Guidelines for northern goshawk prohibit habitat alteration within 100 acres around nest sites. They also prohibit continuous noise within 600 feet of nest sites during the nesting season. Although existing roads may be maintained, new road construction is permitted only if no other reasonable roading alternatives outside mapped nesting habitat exist.

Surveys for Forest Service sensitive plant species would be conducted as part of project-level planning during the summer of 2001. A pre-field review addressing the potential occurrence of TES plants is provided in Appendix B of this EA. Appendix C contains an integrated weed management plan. Management of noxious weeds is an important aspect of maintaining native plant communities and habitat diversity. Data collected during TES plant surveys will also be used to help finalize the weed management plan.

Issue 8: Consideration of regulatory setting and requirements, balanced use, funding mechanisms, and effects on project schedule associated with entry into the roadless area.

During the scoping process, many local residents commented on the need to improve the safety and convenience of travel between the communities of Coffman Cove and Thorne Bay. Many also commented on the need to develop a direct route that could be used

year-round. Each of the alternatives evaluated in this EA would improve safety and convenience. Three alternatives (Alternatives 3, 4 and 5) would be considered more direct. One of these (Alternative 3) proposes a paved surface, and the alpine pass along the route could be plowed during the winter to keep the road open between Coffman Cove and Thorne Bay. However, at the current time, the Forest Service does not have the authority to provide operational (see explanation next page) services, such as snow removal, and there is no funding commitment by either of the communities to undertake maintenance. Alternative 5 would be constructed at low elevations along the entire route, and in most years would remain passable without plowing. The drawback to Alternative 5 is that it would require entry into the Ratz inventoried roadless area. Environmental concerns related to construction within this area were discussed previously under Issue 7. The sections below discuss planning, regulatory, and funding issues associated with Alternative 5, specifically the construction of a new road through the inventoried roadless area between Ratz Harbor and Eagle Creek.

Existing Conditions

During 2000, the Forest Service conducted an inventory and evaluation of roadless areas at the national level to plan the future direction of management of these areas. Inventoried roadless areas are those areas greater than 5,000 acres without existing forest roads. The Ratz roadless area is 5,184 acres in size, and the proposed road construction could reduce acreage below the threshold.

Based on findings of the inventory and the subsequent EIS, President Clinton signed the Roadless Area Conservation Rule, which prohibits the construction of new roads within inventoried roadless areas. President Clinton signed the rule on January 12, 2001, but administrative regulations require a 60-day delay on such rulings, due to their potential socioeconomic significance. Upon initial review of the Roadless Rule by the Bush administration, an additional 60-day delay was placed on implementation of the rule.

The Roadless Area Conservation Rule is presently the subject of eight lawsuits involving seven states, in six federal districts and four federal circuits and is destined to be embroiled in legal controversy and process for a very long time. As an interim measure to ensure that the roadless areas are protected in a manner that is fully compliant with law, as outlined in the National Environmental Policy Act and the National Forest Management Act, the Chief of the Forest Service has sole responsibility for decisions regarding timber harvest and road construction in inventoried roadless areas.

In the absence of the Roadless Area Rule, there would be no administrative restriction on road construction proposed under Alternative 5. The road alignment is identified as a proposed State Road Corridor in the 1997 Record of Decision for the Tongass Land Management Plan. Proposed State highway corridors are managed following the goals and objectives of the Transportation and Utility Systems (TUS) LUD, once construction has been initiated. Prior to construction, the management prescription of the corridor is to follow the standards and guidelines of the underlying LUD. The proposed State highway route between Ratz Harbor and Eagle Creek is designated as Modified Landscape LUD.

When a National Forest System Road provides a connection between communities, serves local needs, or connects public roads within the Forest, it can be designated as a Forest Highway. Usually, Forest Highways are upgraded to State Highway standards, and jurisdiction is relinquished to the State. To date, the Alaska Department of Transportation and Public Facilities, the Federal Highway Administration and the Forest Service have agreed to designate a potential 362 miles as Forest Highways. The State has been given the jurisdiction and maintenance responsibility on 181 miles. As mentioned above, the Forest Service does not currently have the authority to provide operational services, such as snow removal. For this reason, relinquishing authority to the State is usually beneficial in providing these types of services to local communities. However, through the PFSR program the Forest Service can be authorized to operate and maintain roads used for public transportation. It is the Forest Service's intent to act in place of the State and operate and maintain the road selected for proposed action.

Effects of the Alternative

The feasibility of implementing Alternative 5 would be affected by other policy and regulatory concerns, even if the Roadless Rule is overturned. As discussed under Issue 7, construction of the new road segment under Alternative 5 would cause significant environmental impacts. Preparation of an EIS would be required to address effects on soils, water quality, wildlife, subsistence, and scenery. For this reason, selection of Alternative 5 would likely result in a delay.

Recent environmental analyses conducted by the Forest Service for other projects in the vicinity (e.g., Luck Lake EIS) suggest that implementation of Alternative 5 would be controversial, even in the absence of an administrative restriction, because of concerns about protection of natural resources and subsistence values. Controversial road projects may be difficult to fund, due to the lengthy regulatory and permitting process they entail. The Forest Service expects to receive authority to expend funds as a Public Road Authority in 2003-04, but controversial or complex projects do not fit the profile for eligibility and PFSR funding may be withheld.

Funding might also be difficult to obtain because of the existence of other, less controversial alternatives for achieving the purpose and need for the proposed action. For example, the need for a year-round, all-season heavy haul route (160,000 GVW) as an alternative to the State maintained and weight controlled (80,000 GVW) highway could be met through the allocation of special haul permits for existing State highways. Although longer and less convenient, existing State highways also allow for year-round, all-season travel for passenger vehicles between the communities of Coffman Cove and Thorne Bay.

In light of the unknowns surrounding it, selection of Alternative 5 as the preferred alternative would likely delay the project indefinitely. Other alternatives would not be affected by regulatory, administrative, or funding concerns, and could be implemented immediately. Selection of Alternatives 2 or 3 would effectively prevent construction of a new road segment through the roadless area, even if the Roadless Rule were overturned, because they would commit resources irretrievably to improvement of other road

segments. Alternative 4, however, would allow for construction of a new road segment in the future. Alternative 4 would reconstruct the existing road segments north and south of the roadless area without entering it. This alternative would improve current travel conditions, retain the current roadless condition, and keep an option open for establishing the new road segment to further improve travel conditions.

OTHER ENVIRONMENTAL CONSIDERATIONS

The following sections discuss several resources and uses of the project area that will not be affected by the proposed action or that will not be affected to a significant degree, such as land status or minerals. This section also addresses resources that are important on a forest-wide basis or must be addressed in order to comply with federal or state regulations, but that were not identified during scoping as key issues, e.g., wetlands and heritage resources.

Readers may note that several of the following resource areas were described earlier in this document. Fish passage was addressed under Issue 5; water quality was addressed under Issue 6; and natural resources in the Ratz roadless area were addressed under Issue 7. The following sections are intended to discuss some of these items in more general terms. An attempt has been made to minimize duplication, but some overlap could not be avoided.

Air Quality

Air quality of the Forest is generally good, due to airflow from the Pacific Ocean and low levels of development and industry (USDA Forest Service 1997). Each alternative would affect air quality during the construction period, by increasing the emission of exhaust fumes, dust and airborne particulates. These effects would be local and temporary. Effects would be similar under all action alternatives, except that unpleasant odors associated with paving would result from implementation of alternatives 2, 3 and 4.

Over the long term, the proposed action is expected to result in more traffic on project area roads. This, together with improvements to other roads in the project area (e.g., Coffman Cove Road) and construction of a ferry terminal at Coffman Cove, could increase ADTs, which would increase exhaust emissions in the project area. However, the overall effect would not be significant. Forest Service Standards and Guidelines for air quality are to maintain current air quality, Forest-wide, and to ensure that predicted emissions do not exceed state standards.

Heritage Resources

Extensive archeological investigations have been conducted in the Sandy Beach Project Area, but very few archeological or historic sites have been recorded. One site is located in Coffman Cove, outside National Forest System lands. Haida people are known to have used the coast as far north as Thorne Bay (USDA Forest Service 2000a).

Work conducted for Alternatives 2, 3 and 4 would occur in areas already disturbed by construction and traffic. Under Alternative 5, the Forest Service would consult with SHPO prior to project implementation to determine whether field surveys would be

needed for new road construction, due to the potential for the presence of cultural resources at low elevation sites near the shoreline.

Land Status

None of the action alternatives would affect the status of Federal, State or Native lands or land selections or claims.

Minerals

Geology and mineral resources within the Sandy Beach project area were evaluated by reviewing geologic maps of the area. According to a geology geographic information system (GIS) layer obtained from the USFS, road right-of-ways in Alternatives 3 and 4 are located on carbonate rock north of the Luck Lake intersection. According to the Forest Geologist, no karst features are associated with this carbonate rock unit. According to a geologic map entitled "Geology of the Craig Quadrangle Alaska" (Condon, 1961), no mining claims are located within the area that will be affected by the road reconstruction, and there is little potential for significant mineral development.

Plans of Other Agencies

The CEQ regulations implementing NEPA require a determination of possible conflicts between the proposed action and the objectives of Federal, State and local land use plans and policies. The major land use regulations of concern are Section 810 of ANILCA (discussed below under Subsistence), the CZMA, and the State of Alaska's Forest Practices Act.

The proposed action would be consistent with the CZMA and FPA, because Forest Service Standards and Guidelines meet or exceed those required by the Alaska Coastal Management Act for coastal management and those required by the Forest Practices Act for stream buffers to protect riparian zones.

Fisheries and Water Resources
Existing Conditions

Fisheries: The Sandy Beach project area includes over 392 miles of streams. Many of these streams contain abundant resident and/or anadromous fish populations and high quality salmonid spawning and rearing habitat. Salmonids likely found within the project area include cutthroat trout (*Oncorhynchus clarki*), Dolly Varden char (*Salvelinus malma*), coho salmon (*O. kisutch*), steelhead trout (*O. mykiss*), chum salmon (*O. keta*), pink salmon (*O. gorbuscha*) and sockeye salmon (*O. nerka*). Currently there are no known populations of federally listed threatened or endangered fish species in the project area.

The Luck Lake drainage is listed by ADF&G as a high quality sportfishing stream for coastal cutthroat trout. The Luck Creek/Luck Lake/Eagle Creek drainage has the highest escapement of pink, chum, sockeye and coho salmon in the vicinity, and the lower reach of Luck Creek at the head of Luck Lake is considered a high-density fish habitat area. Spawning habitat may be present for steelhead, and is documented for coho and sockeye salmon. Sockeye from the Luck Lake drainage are considered somewhat unique; this

stock shows reverse sexual size dimorphism, with females generally longer in length than males.

In addition to high fish densities, Eagle Creek is known for poaching and numerous violations of sportfish regulations. Most violations involve keeping undersized steelhead and using bait. Due to regional declines in steelhead populations, ADF&G has occasionally implemented restrictions on fishing in the entire Luck Lake drainage during recent years.

Water quality: A recent watershed analysis was conducted to analyze the effects of timber harvest in the Luck Lake area (USDA Forest Service 2000a). The results of sediment modeling performed as part of the analysis indicated that the Luck Creek/Luck Lake/Eagle Creek watershed was at very high risk of being adversely affected by upstream sources of sediment.

Wetlands: Wetlands are defined as "those areas that are inundated or saturated by surface or groundwater with a frequency and duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted to life in saturated soil conditions" ((40 CFR 230.41(a)(1)). Many of the wetlands in the Project area are associated with lakes, ponds and streams. Others are not associated with surface water bodies, and are supported instead by groundwater. A groundwater table 12 inches below the soil surface for as little as two weeks during the growing season may be sufficient to support wetlands.

In addition to saltwater, lakes, and rivers, the GIS database for the project area includes almost 98,000 acres of wetlands, or almost 65 percent of the acreage. The wetland coverage is based on soils and plant community types. Map interpretations include somewhat poorly drained soils on relatively steep slopes that do not always meet the hydrology criteria for classification as wetlands. Thus, mapping based on soil types likely overestimates the acreage of forested wetlands on steep slopes.

Twelve wetland types are found in the project area (Table 3-12). The most common types are forested wetlands and forested wetland complexes, where small inclusions of other wetland types or uplands are intermixed with forested wetlands. Together, these types account for 77,068 acres, almost 80 percent of the wetlands in the project area.

Four wetland types – estuaries, tall sedge fens, scrub-shrub alder willow, and moss muskeg/sphagnum peat muskegs – are considered high value wetlands, based on both scarcity and the functions they perform. These wetlands provide important habitat for fish and numerous wildlife species. They are also important in maintaining streambank and shoreline protection, regulating streamflow, and filtering out sediments and nutrients that could affect water quality.

Table 3-12. Wetland Types and Acreages in the Project Area

Wetland Type	Wet-Hab Code	Acres
Alpine shrubland/emergent muskeg	AM	11,323
Estuarine emergent	E	240
Bog/fen complex	EM	5,792
Forested wetland/emergent sedge complex	FES	20,652
Forested wetland/non-forested upland complex	FIA	3,910
Forested wetland/forested upland complex	FIC/FIW	10,709
Forested wetland/moss muskeg complex	FSS	1,856
Forested upland/moss muskeg complex (at least 50% forested)	FSW	1,617
Forested wetland	FW	38,324
Moss muskeg (sphagnum peat muskeg)	MP	1,531
Emergent tall sedge muskeg	MT	1,258
Scrub-shrub	SES	567
Total		97,787

Estuaries are regionally recognized as the most important wetland type for fish and wildlife. This wetland type supports mainly sedge and beach ryegrass plant communities. The soils are poorly drained silts, sands and gravels. Estuaries serve as tidal/freshwater mixing zones and areas of sediment and nutrient deposition and storage. They are used by many saltwater aquatic species, and are also important for wildlife. A total of about 240 acres of estuarine emergent wetland are mapped in the project area.

Tall sedge fens are considered part of the floodplain process group and are usually found on the footslope or adjacent to floodplains, in deep, poorly drained peats or fine alluvial sediments, but may also form in de-watered beaver ponds. They serve an important function in maintaining water quality by filtering large amounts of water running from hillslopes. Tall sedge fens account for approximately 1,258 acres in the project area.

Moss/sphagnum peat muskegs occur on very poorly drained organic soils derived from a relatively moderately decomposed accumulation of sphagnum moss. Approximately 1,531 acres of this wetland type occur in the project area.

Scrub-shrub alder/willow wetlands consist of trees less than 25 feet high, located along rivers and perennial streams. These wetlands provide important habitat for birds, deer, beaver, and black bear, and also serve to stabilize streambanks and shorelines. The project area includes about 567 acres of this wetland type.

Wetlands are well-distributed throughout the project area. For this reason, and because each of the alternatives shares a 27-mile common route, about the same acreage of wetlands and about the same mix of wetland types is present along each of the alternative routes.

Effects of the Alternatives

Fisheries: As mentioned under Issue 5, fisheries resource concerns center around fish passage at culverts and adverse impacts on fish habitat that may be caused by sedimentation. Temporary effects of road construction would be of particular concern in watersheds with steep slopes and unstable soils. Based on the watershed analysis mentioned above, reconstruction of NFSR 30 and NFSR 3030 under Alternatives 3 or 4 would require work in drainages that have already been significantly affected by timber harvest and road construction.

Alternative 3 proposes a one-lane paved road in this segment. Alternative 4 proposes a one-lane gravel road, while the modified Alternative 4 proposes a two-lane gravel road. The level of engineering required to reconstruct the upper end of the road segment (i.e., from Little Lake downstream about 2 miles) would be high in terms of the amount of clearing, excavation, grading, cutting and filling that would be needed (See Appendix A, Transportation Engineering Report). The high level of effort suggests that effects on slope stability, water quality, and consequently, on fish habitat, would also be high. Portions of the road near the head of Luck Lake would be considered low-impact, while a medium level of engineering effort is predicted for the portion of the road as it follows along the west shore of the lake toward Eagle Creek.

Under Alternatives 3 and 4, not all culverts would necessarily be replaced, because the road would remain one lane. All culverts would be replaced under modified Alternative 4, because the road would be upgraded to a two-lane width.

Water Quality: Because of the wider footprint of the road, modified Alternative 4 would be more likely to adversely affect fish habitat and water quality during construction, and could cause additional long-term effects because of the proposed gravel surfacing. Long-term effects of Alternative 4 would be the same as under current conditions (one-lane gravel road). Modified Alternative 4 would be more likely to have long term effects than either Alternative 3 or 4. As mentioned previously (Issue 6), road surfaces and road maintenance may cause indirect effects on fisheries resources. Gravel-surfaced roads produce airborne dust that may settle in streamside and riparian areas, and over time, produce rock flour that can be washed into streams during heavy rains.

Construction of Alternative 5 could affect important fisheries resources in the vicinity of Eagle Creek. Reconstruction of FH3030100 would cross Eagle Creek. The expected level of engineering effort would be medium (See Appendix A), and construction could temporarily reduce water quality. Because this area is already subject to a high incidence of poaching and violation of sportfishing regulations, increased access into the area as a result of Alternative 5 may be of more concern.

Wetlands: Under any alternative, activities associated with road construction (e.g., excavation, fill, soil compaction, culvert placement) could directly affect the size and characteristics of wetlands by blocking or altering inflow or outflow. The degree of impact would depend to a great extent on the type of wetland and the type of road construction selected. As previously mentioned, the large number of wetlands in the

project area would make it difficult to avoid affecting wetlands during road layout under any alternative. The acreage and variety of wetlands present along each of the alternative routes is similar, and the areas where engineering challenges are expected to require the most ground disturbance are located along the common route. For these reasons, the effects of the proposed action on wetlands would be similar under each alternative.

Cumulative Effects

Under Alternatives 2, 3 and 4, road reconstruction proposed in the upper portion of a watershed that provides important fish habitat could contribute to cumulative effects already caused by timber harvest and associated increases in sediment delivery to Class I and II streams. Alternatives 3 and 4 would affect more of the watershed than Alternative 2. Alternative 5 would not affect the Luck Creek/Luck Lake drainage, but would increase access into an area where fishing pressure on steelhead is already high.

Cumulative effects on wetlands would occur under any of the action alternatives, since not all wetlands could be avoided during construction. This situation will also be encountered in other project areas on Prince of Wales Island, where other road improvements are being planned or implemented. Implementation of Forest Standards and Guidelines will help to minimize cumulative effects, through mitigating impacts that cannot be avoided.

Mitigation Measures

In addition to Forest-wide standards and guidelines (USDA 1997), fish passage standards and BMP's mentioned under Issue 5 and Issue 6, implementation of recommendations based on the Road Condition Survey database would help to prevent adverse impacts. Coordination with ADF&G may be needed to plan management measures specific to Eagle Creek that would help protect steelhead and other fish populations.

As mentioned under Issue 7, Forest Service Standards and Guidelines for wetlands are consistent with Section 404 of the Clean Water Act, in first attempting to avoid impacts on wetlands wherever there is a practicable, environmentally preferred alternative. The large number of wetlands in the project area makes complete avoidance difficult; where avoidance is not possible, Forest Service direction is to minimize impacts on wetlands and maintain wetland functions and values.

A wetland delineation and general assessment of functions and values will be conducted in the summer of 2001, prior to implementation of any alternative. Collection of site-specific data will be used to help ensure that the final layout of road and recreation projects do not adversely affect high value wetlands, including tall sedge, moss/sphagnum peat muskeg, estuarine, or alder/willow wetlands.

Where wetland impacts cannot be avoided, clearing limits will be minimized. Properly sized culverts and coarse rock roadbed will be used to help maintain the flow and reach of water that support wetlands. By minimizing the amount of side-ditching, effects on groundwater flow and soil moisture are also minimized.

Silviculture and Timber Management

The proposed action would not affect silviculture or timber management in the project area.

Socioeconomics

The economy of Prince of Wales Island is based primarily on logging, despite downward trends in job opportunities associated with the timber industry over the past several years. The communities of Coffman Cove and Thorne Bay are shifting their economic emphasis to tourism and recreation and other economic interests. As discussed under Issue 3 (increased demand for roads) and Issue 4 (recreation), the resident population of Prince of Wales is projected to increase 60 percent between 2000 and 2018, and additional growth is projected to result from new ferry access and improved roads, such as the Coffman Cove Road.

All of the action alternatives would affect socioeconomics by increasing job opportunities for local residents both during the construction period and over the long term. All of the action alternatives would likely increase the number of visitors to Coffman Cove and Thorne Bay. Tourism and recreation (including sightseeing, camping, hiking, hunting, trapping, fishing, boating) would contribute to the local economy in revenues for lodging, equipment, supplies, guides, and other services.

Soils

Soil disturbance will occur along the road reconstruction rights-of-way during implementation of Alternatives 2 through 5 as a result of road widening, rock pit expansion, and creation of new rock pits to obtain construction materials. Table 3-13 presents the acres of very high mass movement index (MMI-4) and high (MMI-3) soils that would be encountered during construction of each alternative.

Table 3-13. Acres of MMI-3 and –4 Soils Disturbed by Alternative

Alternative	Acres of MMI-3 Soils	Acres of MMI-4 Soils
Alternative 2	368	13
Alternative 3	326	13
Alternative 4	253	15
Alternative 5	211	9

A review of Table 3-13 indicates that Alternative 2 would result in the greatest amount of disturbance to MMI-3 and 4 soils while Alternative 5 would result in the least amount of disturbance to MMI-3 and 4 soils.

Scenic Resources
Existing Conditions

Visual character of the project area

The project area lies in the northern portion of Prince of Wales Island, a highly scenic area that contains numerous streams, wetlands, and lakes in a forested and mountainous

setting coupled with an extensive saltwater shoreline. The elevation of the project area ranges from sea level to just over 3,000 feet (Baird Peak). Forest cover is coniferous and generally dense with scattered openings. Mountains have extensive alpine and subalpine areas with little or no forest cover and steep, densely forested hillsides. A wide variety of landforms are present. Many streams within the project area are oriented from west to east and empty into Clarence Strait. Major lakes include Baird Lake, Luck Lake, Little Lake, Big Lake, and Salamander Lake.

Hatchery Lake, Sweetwater Lake, and the Gold and Galligan Lagoon are part of the Hatchery Creek system. Lake Galea, which is part of the Thorne River system, is located in the southwest portion of the project area.

The visual condition of the project area varies by location and is dependent on a variety of factors. In addition to the natural aspects just described, timber harvesting and road construction have altered the visual character of portions of the landscape. Approximately 75 percent of the project area is in an unaltered and naturally appearing condition. About 20 percent of the area is in a slightly altered condition, consisting of timber units harvested between 1947 and 1977. The remainder of the project area, approximately 5 percent, is moderately to heavily altered (USDA Forest Service 2000a).

Existing roads within the project area include the Control Lake to Thorne Bay Road (NFSR 30 or FH 42), the Coffman Cove Road (NFSR 30 or FH 44), the Luck Lake to Coffman Cove Road (NFSR 3030), and the Sandy Beach Road (NFSR 30 or FH 51) that runs between Thorne Bay and Ratz Harbor. The existing roadside environments share most of the visual characteristics of the surrounding landscape, but include some contrasting structures, a higher percentage of past timber harvest, and other geometric elements. The existing roadways are steep-sided and have numerous sharp curves. Roadway surfaces are one to two lanes wide and surfaced in gravel. Culverts, signs, bridge abutments, and bridge decking are also seen. Views from points along and adjacent to most project area roads are dominated by forest and forest management practices. Green is the dominant color, and the forest views create a complex, strongly contrasting visual interplay of light and shadow. The existing gravel roadways form a grayish, horizontal visual element that contrasts with their surroundings. On the Sandy Beach Road between Slide Creek and Ratz Harbor, views are dominated by the blue-greens of Clarence Strait.

Visual Priority Travel Routes and Use Areas

The Forest Plan includes forest-wide scenery standards and guidelines. These standards and guidelines include designations of Visual Priority Travel Routes and Use Areas, as well as visual quality objectives that vary by land use designation and apply to any activity (including roads) that could affect the visual character of the landscape.

Management standards and guidelines in the Forest Plan emphasize scenery from designated Visual Priority Travel Routes and Use Areas (Visual Priority Areas). Nineteen such Visual Priority Areas are found in the vicinity of the proposed project.

The following six Visual Priority Areas are potentially affected by reconstruction of the Sandy Beach Road:

- Alaska Marine Highway in Clarence Strait
- Thorne Bay to Sandy Beach Road
- Luck Lake Developed Boat Launch
- Sandy Beach Developed Picnic Area
- Big Ratz Harbor Boat Anchorage
- Little Ratz Harbor Boat Anchorage

Visual quality objectives

Visual quality objectives (VQOs) are a set of measurable goals for the management of visual resources with the Forest. They are based on a variety of physical and sociological parameters, including land use designation (LUD) and Distance Zone, which may be defined as the distance between the potential viewer and the managed activity. The Forest Plan defines four distance zones used in the application of VQOs:

- Foreground-located less than one-half mile from the viewer
- Middleground-located between the limit of the foreground distance zone to approximately 3 miles
- Background-located from the limit of the middleground distance zone to infinity
- Not Seen-located in areas unseen from Visual Priority Travel Routes and Use Areas

VQOs within the project area include Retention, Partial Retention, Modification, and Maximum Modification. Under the Retention VQO, managed activities are not visually evident to the casual visitor. This objective is to be accomplished within six months following project completion. As described in the Forest Plan, when a National Forest System Road is a Visual Priority Area, rock sources should be located off the road whenever possible. Spur road access may be necessary to minimize visual impacts. Rock source development should not be apparent from the road, use area, or marine trail route if this VQO is to be met. Roadside cleanup of ground disturbing activities should be provided. Depending on site conditions, stumps should be cut as low as possible and angled away from the viewer.

Under the Partial Retention VQO, design activities should be subordinate to the landscape character of the area. This VQO should be accomplished within one year of project completion. Rock sources should be designed to be minimally apparent from Visual Priority Areas. Rehabilitation is usually necessary following closure of rock source developments. It may be necessary to modify some ground disturbing activities

seen from the foreground of Visual Priority Areas. Roadside cleanup of ground disturbing activities may be necessary.

Activities may visually dominate the characteristic landscape in areas with a Modification VQO, but these activities must have visual characteristics similar to those of natural occurrences within the surrounding area or character type. This VQO should be met within one year following project completion in the foreground distance zone and within five years in the middleground and background distance zones. When planning activities, naturally established form, line, color, and texture are to be considered. Rock source operations and resulting landform modifications may be evident to the casual observer as seen from Visual Priority areas. However, the quarry location and design should mitigate, to the extent feasible, the apparent visual size and dominance of the activity (for example, shaping of back walls, roadside screening and general orientation of the opening).

Under the Maximum Modification VQO, activities may dominate the characteristic landscape, yet when viewed as background, they should appear to be a natural occurrence. Activities should be located and designed to take advantage of existing (both natural and imposed) patterns and textures found in the landscape when viewed in the middleground from Visual Priority Areas. Activities should be designed to resemble natural occurrences when viewed in the background distance zone.

Land Use Designation and VQOs within the project area

Land use designations (LUD) within the project area are shown on Figure 1-2. VQOs associated with these LUDs are identified in Table 3-14.

Table 3-14. Visual Quality Objectives (VQO) by Land Use Designation (LUD).

LUD	Foreground Distance Zone	Middleground Distance Zone	Background Distance Zone	Not Seen
Old Growth Habitat	Retention	Retention	Retention	Retention
Scenic River	Retention	Partial Retention	Partial Retention	Modification
Recreation River	Partial Retention	Partial Retention	Partial Retention	Maximum Modification
Scenic Viewshed	Retention	Partial Retention	Partial Retention	Maximum Modification
Modified Landscape	Partial Retention	Modification	Modification	Maximum Modification
Timber Management	Modification	Maximum Modification	Maximum Modification	Maximum Modification
Transportation and Utility System*	Modification	Not Applicable	Not Applicable	Not Applicable

* VQOs for this LUD apply only to the actual corridor. Adjacent areas are managed according to guidelines of the adjacent LUD(s).

Effects of the Alternatives

Project Area Visual Priority Travel Routes and Use Areas

One or more of the project alternatives would affect six Visual Priority Areas located on National Forest System lands. With the exception of the new roadway proposed between Ratz Harbor and Eagle Creek under Alternative 5, all road upgrades would follow the alignment of existing roadways. No views would be blocked or obscured. Visual effects would generally be modest and Adopted VQOs achieved. Curve widening and slope cutting/filling along the roadside clear zones and the associated vegetation removal would generate the majority of visual effects, regardless of paving width and surfacing material. Improved gravel roadways would be wider and, therefore, somewhat more visible when viewed from surrounding Visual Priority Areas. They would also have crisper geometric features and more cleared area than the existing roadways, along with guardrails and ditches. Gravel road surfaces are visible from farther away (i.e., foreground, middleground, and background distance zones) than asphalt road surfaces, due to the light gray to white material used. Paved roadways would contrast with their surroundings to a greater extent than existing gravel roadways, as well as having crisp geometry, linear foglines and centerlines, guardrails, ditch lines, and roadside cleared areas. Because asphalt paving is black, it would recede into the landscape better than gravel paving when viewed in the middleground and background. Lastly, the recreational enhancements associated with each action alternative have the potential to affect scenic resources within the Project area. However, insufficient information exists with which to adequately quantify these effects.

Except where noted below, all alternatives would achieve the Adopted VQOs, as seen from established Visual Priority Areas:

Alaska Marine Highway in Clarence Strait

Alternatives 2, 3, or 4 would upgrade the roadway between Thorne Bay and Ratz Harbor to two-lane paved. Some deep cuts may be necessary to achieve the required horizontal and vertical alignments. These cuts, which would expose lightly colored substrates that contrast sharply with the surrounding dark green landscape, and the associated roadway would be visible in the middleground from the Alaska Marine Highway between Sal Creek and Ratz Harbor. This road corridor is within the TUS LUD and would achieve the Modification VQO within one year of project completion, as seen in the foreground from the roadway itself. Small portions of this route are within the Old Growth LUD and have a VQO of Retention. While these activities would be visually evident to the casual users of Clarence Strait (i.e., they would not meet the Retention VQO), several measures will be used to minimize visual impacts. These measures include locating rock source developments so they are not apparent from the Alaska Marine Highway, cleaning up ground disturbing activities as soon as feasible, and implementing revegetation measures within six months of construction completion to reduce visual contrast with the surrounding landscape.

Alternative 5 would upgrade the roadway between Thorne Bay and Ratz Harbor to gravel two-lane. Again, this roadway is within the TUS LUD and would achieve the Modification VQO within one year of project completion, as seen in the foreground from the roadway itself. This roadway could require fewer deep cuts than the paved roadway in Alternatives 2, 3, or 4. However, the lightly colored surfacing material would be somewhat more contrasting in color than the paved roadway in Alternatives 2, 3, or 4, as seen in the middleground. The small portions of this route within the Old Growth LUD would not achieve the Retention VQO as seen in the middleground from the Marine Highway. Mitigation measures (similar to those described above) would be implemented in these areas to reduce visual contrasts. Alternative 5 would also construct a one-lane gravel road with inter-visible turnouts between Ratz Harbor and Eagle Creek. This roadway is also within the TUS LUD and would achieve the Modification VQO within one year of project completion, as seen in the foreground from the roadway itself. As seen in the middleground from the Alaska Marine Highway in Clarence Strait, the road would achieve the Modification VQO corresponding to the Modified Landscape LUD. Naturally established form, line, color, and texture would be considered during layout and construction. Rock source operations and resulting landform modifications would be evident to the casual observer as seen from the Alaska Marine Highway in Clarence Strait. However, the quarry location and design would mitigate, to the extent feasible, the apparent visual size and dominance of the activity (for example, shaping of back walls, roadside screening and general orientation of the opening).

Thorne Bay to Sandy Beach Road

The roadway that forms this Visual Priority Area would be altered in each of the action alternatives. Alternatives 2, 3, or 4 would upgrade the roadway between Thorne Bay and Sandy Beach to two-lane paved. Such upgrades would be within the TUS LUD and would achieve the Modification VQO within one year of project completion, as seen in the foreground from the roadway itself. Some deep cuts may be necessary to achieve the required horizontal and vertical alignments. These cuts, which would expose lightly colored substrates that contrast sharply with the surrounding forested landscape, would be highly visible in the foreground from the road. Visual effects would be relatively small, however, since many motorists tend to focus on views from the road rather than views of the road itself. Alternative 5 would upgrade the roadway between Thorne Bay and Sandy Beach to two-lane gravel. Again, such upgrades would be within the TUS LUD and would achieve the Modification VQO within one year of project completion, as seen in the foreground from the roadway itself. This roadway could require fewer deep cuts and would be somewhat less contrasting in color and form than the paved roadway in Alternatives 2, 3, or 4. As stated above users are likely to focus their attention on Clarence Strait and not on the roadway, making the actual visual effects rather small.

Luck Lake Developed Boat Launch

Alternatives 2 or 3 would perform no roadwork visible from the Luck Lake Developed Boat Launch.

Alternatives 4 or 5 would upgrade the existing roadway in the vicinity of the Luck Lake Developed Boat Launch from gravel one-lane to gravel one-lane with inter-visible turnouts. The visual effects associated with this activity would be minimal and the Partial Retention VQO (corresponding to Modified Landscape LUD in the foreground) achieved.

Sandy Beach Developed Picnic Area

Alternatives 2, 3, or 4 would upgrade the existing roadway to two-lane paved within the foreground of the Sandy Beach Developed Picnic Area. Visual effects would be relatively small, however, since most users tend to focus on views across Clarence Strait rather than views of the road itself. Appropriate mitigation measures (such as designing rock sources and modifying ground disturbing activities to minimize visibility) would be applied to ensure that this activity remains subordinate to the surrounding landscape and the Partial Retention VQO (corresponding to Modified Landscape LUD in the foreground) is achieved.

Alternative 5 would upgrade the existing roadway to two-lane gravel within the foreground of the Sandy Beach Developed Picnic Area. The form and color contrasts generated by this upgrade would be similar to those described above for Alternatives 2, 3, or 4. Users are likely to focus their attention on Clarence Strait and not the roadway Mitigation measures similar to those described above would help ensure that the Partial Retention VQO is achieved.

Big Ratz Harbor and Little Ratz Harbor Boat Anchorages

Alternatives 2, 3, or 4 would upgrade the existing roadway to two-lane paved within the foreground of these Visual Priority Area anchorages. Portions of the Project area seen from the anchorages are within the Modified Landscape LUD and have a VQO of Partial Retention. Appropriate mitigation measures (such as designing rock sources and modifying ground disturbing activities to minimize visibility) would be applied to ensure that this activity remains subordinate to the surrounding landscape and the Partial Retention VQO is achieved.

Alternative 5 would upgrade the existing roadway to two-lane gravel within the foreground of the Big Ratz Harbor and Little Ratz Harbor Boat Anchorages. The form and color contrasts generated by this upgrade would be similar to those described above for Alternatives 2, 3, or 4.

Cumulative Effects

Cumulative effects are the result of collective past, present, and reasonably foreseeable future actions. These effects include roads and associated disturbance, recreation developments, and timber harvest.

Over time the form, line, color, and texture effects generated by the proposed roadways, road upgrades, and recreation facilities would diminish and the developments would blend into the surrounding landscape. Scenic resources will then be predominately affected by surrounding land use designations. Landscapes seen from the affected

roadways within LUDs that stress timber management, such as the Timber Management LUD, will continue to be visually disturbed, while those seen from LUDs that emphasize recreation and/or natural resources, such as Semi-Remote Recreation and Recreation River, will appear largely undisturbed.

Mitigation Measures

Measures proposed to mitigate potential impacts on scenery are described by VQO below:

Retention VQO

- Keep vegetation clearing to a minimum and within close proximity of the road.
- Select materials and colors that blend with those found naturally in the vicinity.
- Screening should be used from viewpoints and travel routes if feasible.
- When a National Forest System Road is a Visual Priority Area, locate rock sources off the road when possible. Spur road access to rock sources may be necessary to minimize visual impact. Rock source development should not be apparent from the Thorne Bay to Sandy Beach Road, adjacent use areas, or the Alaska Marine Highway in Clarence Strait.
- Provide for roadside cleanup of ground disturbing activities. Depending on site conditions, cut stumps as low as possible and angled away from viewer.
- Where feasible, remove slash and debris generated during past timber harvest and other management activities.
- Coat metallic, highly reflective materials with a matte paint or finish.
- Revegetate staging areas, construction, and material source and waste sites with native vegetation as soon as feasible following construction.

Partial Retention VQO

- Keep vegetation clearing to a minimum and within close proximity of the road.
- Emphasize enhancement of views from recreational facilities.
- Select materials and colors that blend with those found naturally in the vicinity.
- Design rock sources to be minimally apparent as seen from Visual Priority Areas. Rehabilitation is usually following closure of rock source developments.
- It may be necessary to modify some ground disturbing activities seen from the foreground of Visual Priority Areas.
- Roadside cleanup of ground disturbance may be necessary.
- Coat metallic, highly reflective materials with a matte paint or finish.

- Revegetate staging areas, construction, and material source and waste sites with native vegetation as soon as feasible following construction

Modification

- Siting and design should borrow from naturally occurring patterns in the landscape.
- Rock source operations and resulting landform modifications may be evident to the casual observer as seen from Visual Priority Areas. However, the quarry location and design should mitigate, to the extent feasible, the apparent visual size and dominance of the activity (i.e., shaping of backwalls, roadside screening, and general orientation of the opening).
- Coat metallic, highly reflective materials with a matte paint or finish.
- Revegetate staging areas, construction, and material source and waste sites with native vegetation as soon as feasible following construction

Maximum Modification

- Locate and design management activities to take advantage of existing (both natural and imposed) patterns and textures found in the landscape when viewed in the middleground from Visual Priority Areas.
- Design activities to resemble natural occurrences as viewed in the background.
- Coat metallic, highly reflective materials with a matte paint or finish.
- Revegetate staging areas, construction, and material source and waste sites with native vegetation as soon as feasible following construction.

Wildlife

This section describes wildlife resources in the project area and evaluates the potential effects of the alternatives on habitat and wildlife use patterns. This section focuses on the effects of Alternatives 2, 3 and 4; effects of Alternative 5 were discussed previously under Issue 7.

Existing Conditions

The project area encompasses 147,442 acres, including a mix of upland forest, forested wetlands, muskegs, lakes, scrub-shrub wetlands, and riparian areas along rivers and perennial streams. It also includes estuaries and beach fringe habitat along the eastern shoreline of Prince of Wales Island, and alpine habitats in the vicinity of Baird Peak and Ratz Pass.

As discussed under Issue 7, six Management Indicator Species (MIS) were selected in order to evaluate effects of the alternatives on wildlife in the project area. These include Sitka black-tailed deer, Alexander Archipelago wolf, black bear, marten, river otter,

Vancouver Canada goose and bald eagle. To minimize repetition of descriptions under Issue 7, the discussion below focuses on the effects of the action alternatives on these species.

The potential for noise disturbance was evaluated by delineating a corridor extending ¼-mile from the existing centerline of the road network under consideration. This corridor width was selected in order to identify wildlife resources that could be affected by noise disturbance associated with road improvements and road use, in addition to direct impacts of road widening, realignment, or construction.

Effects of the Alternatives

Noise disturbance during construction: Under any of the action alternatives, impacts on wildlife during construction would be temporary and minor. Species that are intolerant of noise and disturbance would likely avoid construction areas. However, noise disturbance has the potential to interrupt breeding and impair reproductive success in birds and mammals.

The Forest GIS indicates numerous bald eagle nests within ¼-mile of the road corridor. Although not all mapped nests are active each year, the presence of 32 nests along the common route, 13 along the shoreline in the Ratz roadless area, and four located within ¼-mile of proposed activities between Eagle Creek and Coffman Cove indicates that eagle use of the area is high.

Habitat loss: Alternatives 2, 3, 4 and 5 would directly affect habitat only along existing roadways. Alternative 5 also includes construction of approximately six miles of new road. Acres of habitat loss under each alternative vary according to the width of right-of-way (ROW) proposed for each road segment, and according to factors such as underlying geology, soils, slopes, vegetation, streams and wetlands. Although a larger clearing width would be needed to accommodate a two-lane road than a one-lane road, the number of inter-visible turn-outs along a one-lane road would affect the total acreage affected by a particular alignment. Acreage affected could vary from six acres per mile to 12 acres per mile, assuming clearing widths that would average from 50 to 100 feet.

Habitat fragmentation: Since Alternatives 2, 3, and 4 involve only existing roads, no additional habitat fragmentation would be expected to result from implementation of any of these alternatives. Alternative 5 would contribute to habitat fragmentation, because approximately six miles of new road would be aligned parallel to the shoreline, through beach fringe habitat. Impacts of Alternative 5 are discussed in more detail under Issue 7.

Increased access and levels of use: Road improvements and construction associated with existing and new recreation facilities would indirectly affect wildlife by increasing human access in the project area, and in the roadless area in particular. Under any of the action alternatives, improvements would be expected to draw local, tourist and recreation activity into areas that are currently inconvenient to access (or under Alternative 5, currently not accessible by vehicle). The effects this would have on wildlife populations is discussed in more detail under Issue 7, especially with regard to hunting pressure.

Higher design speeds could increase the risk of collisions, although improved sight distances would help to mitigate this effect.

Increased road density: Road density would not increase under any alternative except Alternative 5. Under Alternative 5, density would increase from 1.56 miles per square mile in the project area to 1.59 miles per square mile. Effects of increased road density on wildlife are discussed under Issue 7.

Cumulative Effects

Small habitat losses associated with any of the alternatives would not cause cumulative effects on wildlife. However, some cumulative effects would be expected to result from improved access under any alternative, because improving project-area roads to meet increased demand for roads and recreation is likely to draw additional tourists and permanent residents. In addition to increasing recreation and local traffic, the proposed ferry terminal at Coffman Cove could also increase the number of hunters on Prince of Wales Island. Subsistence hunting in particular could increase, since there is a more liberal deer season on Prince of Wales Island than on other nearby islands (e.g., Mitkof).

Mitigation Measures

Applicable Forest Service Standards and Guidelines regarding timing restrictions and other methods to minimize disturbance would be implemented as described under Issue 7 for wildlife and threatened, endangered and sensitive species. Additional recommended mitigation measures include the following:

- Minimize the area disturbed, especially along stream corridors, and avoid wetlands where possible.
- Install signage to slow traffic along roadways in sensitive areas, where wildlife crossings are frequent.
- Select seed mixes and rooted stock for roadside erosion control that are not attractive to wildlife.

Threatened, Endangered and Sensitive Species

Existing Conditions

Existing conditions information (e.g., habitat requirements, habitat use, known occurrences) about threatened, endangered and sensitive fish, wildlife and plants is provided under Issue 7. In order to minimize repetition, the sections below focus on the effects of each alternative.

Effects of the Alternatives

TES Fish Species: No listed fish species occur in the project area.

TES Wildlife Species: None of the alternatives would affect trumpeter swans, since construction would occur during the time of year when no swans are present. Additional traffic and recreational activity resulting from improvements at the Luck Lake Day Use

Area (all alternatives) would also most likely occur during late spring, summer, and early fall, and therefore would not disturb wintering swans.

Implementation of activities associated with road improvements under Alternatives 2, 3 or 4 would not affect northern goshawk habitat. Trees that would be removed during widening or realignment of existing roadways do not provide suitable nesting habitat, since goshawks are strongly associated with forest interior, rather than edge habitats. Construction of Alternative 5 would remove a small amount (about 138 acres) of potential habitat in beach fringe along the eastern margin of the Ratz roadless area.

Construction of the Big Lake-Trumpeter Lake Trail complex under Alternative 2 or the Baird Peak Trail under Alternative 5 could disturb nesting birds if trails are routed near nests. The potential for noise disturbance associated with other proposed recreation enhancements is low, since they are located at non-commercial forest or non-forested sites, or would be constructed along existing roadways.

Project-level surveys for northern goshawk will be conducted and a Biological Evaluation will be prepared if the selected alternative affects potential habitat. Standards and Guidelines for northern goshawk prohibit habitat alteration within 100 acres around nest sites. They also prohibit continuous noise within 600 feet of nest sites during the nesting season. Although existing roads may be maintained, new road construction is permitted only if no other reasonable roading alternatives outside mapped nesting habitat exist.

TES Plant Species: As part of a Biological Evaluation to address project effects on sensitive species, plant surveys of previously-unsurveyed road segments proposed for improvement or construction will be performed during summer 2001. A pre-held review of TES plants is provided in Appendix B of this document; a BA/BE will be prepared following the field surveys.

Subsistence

Section 810 of ANILCA requires analysis of subsistence uses and resources on National Forest Lands and evaluation of potential effects of management activities. Subsistence analysis usually focuses on three factors relating to fish and wildlife resources. These are 1) abundance and distribution of the resource; 2) access to the resource; and 3) competition for the resource.

Existing Conditions

Subsistence Fish

In 1988, per capita household subsistence fish harvest in Coffman Cove was 146 edible pounds per year, 43 percent of which was salmon and steelhead (ADFG Community Profile Database). Thorne Bay had a similar per capita subsistence rate with 99 edible pounds, of which about 63 percent was salmon. Salmon and trout are harvested throughout the year in both marine and freshwater environments. Subsistence users tend

to harvest in traditional use areas surrounding their communities and generally do not harvest outside these areas (ADFG 1998 as cited in USDOT 2000).

Subsistence Wildlife

Wildlife subsistence resources in the Sandy Beach project area include deer, black bear, marten, wolf and otter. Of these species, deer are most important. The boundaries of the project area correspond to the boundaries of Wildlife Analysis Areas (WAAs) 1420, 1421 and the northern portion of 1531. Analyses presented in the Forest Plan FEIS show that Coffman Cove hunters accounted for most subsistence hunting in WAA's 1420 and 1421, but that hunters from Craig, Klawock and Ketchikan also represented a substantial portion of the total. Hunters from Thorne Bay accounted for most subsistence hunting in WAA 1531, but hunters from Ketchikan also accounted for a large proportion. From 1987 to 1994, an average of 194 deer per year were taken from WAA 1420; 342 from WAA 1421, and 254 from WAA 1531 (USDA Forest Service 1997).

Effects of the Alternatives

Subsistence Fish

With application of the riparian standards and guidelines of the Forest Plan, no significant adverse effects on salmon or trout species are anticipated under any alternative, or cumulatively. Subsistence use of fish in the Sandy Beach project area will not likely be directly affected by the proposed road reconstruction. Alternative 5 will increase accessibility to subsistence fishing in streams crossed by this new road segment. All other alternatives upgrade existing road segments and do not increase access to these areas. However, due to improved road conditions, some road use will likely increase. An indirect effect will be increased numbers of subsistence fishers accessing these areas, especially near the towns of Coffman Cove and Thorne Bay.

Subsistence Wildlife

None of the action alternatives would affect deer abundance in terms of habitat capability, since only small amounts of habitat would be removed for road widening or realignment. Although about 138 acres of beach fringe habitat (considered high-quality deer winter range) would be removed during construction of Alternative 5, this number is not significant in comparison to the reduction of habitat capability that has resulted from past, recent, and on-going timber harvest in the project area and on Prince of Wales Island.

All of the action alternatives would improve hunting access within the project area. Improved access would likely increase competition for hunted species. Recent analyses indicate that the demand for subsistence hunting had already exceeded the harvestable numbers of deer by the mid-1980's (USDA Forest Service 1997). The capability of habitat to support deer is predicted to decline further, to levels that cannot sustain subsistence hunting.

Cumulative Effects

Cumulative effects on subsistence species would result from the proposed action under any alternative. Based on habitat capability modeling conducted for the nearby Luck Lake Timber Sale, deer habitat capability and the abundance of this subsistence resource is expected to decrease in the general project area even without additional timber harvest (USDA Forest Service 2000a). Although the Sandy Beach Road Project may not contribute directly to reductions of deer abundance, it would contribute to increases in competition by improving access. Cumulative effects on competition for subsistence species would be significant, as a result of road improvements currently being planned or implemented for other road networks on Prince of Wales Island, and construction of a new ferry terminal at Coffman Cove. Establishment of ferry service in combination with road improvements could attract subsistence hunters from other islands (e.g., Kuiu, Kupreanof, and Mitkof) where hunting regulations are more restrictive, and would also increase recreational opportunity for sport hunters.

Mitigation Measures

Coordination with ADF&G will be needed to maintain access to subsistence use areas during construction. Coordination with the Southeast Alaska Federal Subsistence Regional Advisory Council and the Federal Subsistence Board will also be needed, in compliance with Forest Service Standards and Guidelines. Implementation of Standards and Guidelines for Road Management will also be important in minimizing any impacts to subsistence.

Transportation

Due to the nature of the proposed action, existing conditions and effects of the alternatives for this resource are integrated into other resource discussions.

FINDINGS AND DISCLOSURES

To proceed with road construction as addressed in this EA, various permits must be obtained from federal and state agencies. The following permits [will be/have been] obtained.

U.S. Army Corps of Engineers

Approval of discharge of dredged or fill material into waters of the United States (Section 404 of the Clean Water Act of 1977, as amended).

Approval of construction of structures or work in navigable waters of the United States (Section 10 of the Rivers and Harbors Act of 1899).

U.S. Environmental Protection Agency

Storm water discharge permit.

National Pollutant Discharge Elimination System review (Section 402 of the Clean Water Act).

State of Alaska, Department of Natural Resources

Authorization for occupancy and use of tidelands and submerged lands.

State of Alaska, Department of Environmental Conservation

Certification of compliance with Alaska Water Quality Standards (Section 401 Certification).

Solid Waste Disposal Permit (Section 402 of the Clean Water Act).

U.S. Coast Guard

Coast Guard Bridge Permit (in accordance with the General Bridge Act of 1946) required for all structures constructed across navigable waters (within the tidal influence zone) of the United States.

APPLICABLE LAWS AND EXECUTIVE ORDERS

Shown below is a partial list of federal laws and executive orders pertaining to project-specific planning and environmental analysis on federal lands. While most pertain to all federal lands, some of the laws are specific to Alaska. Disclosures and findings required by these laws and orders are contained in Chapter 2 of this EA.

Multiple-Use Sustained-Yield Act of 1960

National Historic Preservation Act of 1966 (as amended)

Wild and Scenic Rivers Act of 1968, amended 1986

National Environmental Policy Act (NEPA) of 1969 (as amended)

Clean Air Act of 1970 (as amended)

Alaska Native Claims Settlement Act (ANCSA) of 1971

Marine Mammal Protection Act of 1972

Endangered Species Act (ESA) of 1973 (as amended)

Forest and Rangeland Renewable Resources Planning Act (RPA) of 1974 (as amended)

National Forest Management Act (NFMA) of 1976 (as amended)

Clean Water Act of 1977 (as amended)

American Indian Religious Freedom Act of 1978

Alaska Native Interest Lands Conservation Act (ANILCA) of 1980

Archeological Resource Protection Act of 1980

Cave Resource Protection Act of 1988

Tongass Timber Reform Act (TTRA) of 1990

Magnuson-Stevens Fishery Conservation and Management Act of 1996

Coastal Zone Management Act (CZMA) of 1976

Plant Protection Act of 2000

Civil Rights, Women, and Minorities

Executive Order 11593 (cultural resources)

Executive Order 11988 (floodplains)

Executive Order 11990 (wetlands)

Executive Order 12898 (environmental justice)

Executive Order 12962 (aquatic systems and recreational fisheries)

Executive Order 13112 (invasive species)

State of Alaska

In addition, the Coastal Zone Management Act (CZMA) of 1976, as amended, pertains to the preparation of an EA. Federal lands are not included in the definition of the coastal zone as prescribed in the CZMA. However, the act requires that when federal agencies conduct activities or developments that affect the coastal zone, the activities or development be consistent to the maximum extent practicable with the approved State Coastal Management Program. This determination is made by the Forest Service.

The Alaska Coastal Management Plan incorporated the Alaska Forest Resources and Practices Act of 1979 (as amended) standards and guidelines for timber harvesting and processing. The Forest Service standards and guidelines and mitigation measures described in Chapters 2 and 3 of this document are comparable to or exceed state standards.

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Chapter 4
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Chapter 5
Distribution List

FEDERAL AGENCIES

Department of the Army
Environmental Protection Agency
Federal Highway Administration
FSL-Juneau
National Marine Fisheries Service
National Park Service
Natural Resources Defense Council
U.S. Dept. of the Interior
U.S. Dept. of Transportation
U.S. EPA
U.S. Fish and Wildlife Service
USDA Forest Service, Superior NF
U.S. House of Representatives
U.S. Senate
U.S. Senate, Juneau Office
US Army Corps of Engineers
USDA Forest Service

STATE AGENCIES

ADF&G
ADOT
Alaska Board of Fisheries
Alaska Dept. of Env. Cons.
Alaska Dept. of Natural Resources
Alaska Div. of Govt. Coordination
Legislative Information Office
State of Alaska Tri-Agency Representative

LOCAL AGENCIES

City Administrator
City of Coffman Cove
City of Craig
City of Hydaburg
City of Kasaan
City of Ketchikan
City of Klawock
City of Thorne Bay

Craig Advisory Committee
Craig Community Association
Edna Bay Advisory Committee
Greater Ketchikan Chamber of Commerce
Greater POW Chamber of Commerce
Hydaburg Advisory Committee
Point Baker Community Council
Point Baker Post Office
Port Protection Community Association
Prince of Wales Chamber of Commerce
Southeast Alaska Conservation Council
Sumner Strait Advisory Committee

NATIVE AMERICAN ORGANIZATIONS

Chilkat Indian Village (Klukwan)
Chilkoot Indian Association
Douglas Indian Association
Hoonah Indian Association
Ketchikan Indian Corporation
Klawock Tribal Govt.
Metlakatla Indian Community
Native Village of Kasaan
Organized Village of Kake
Organized Village of Saxman
Petersburg Indian Association
Sitka Tribe of Alaska
Tongass Tribe
Yakutat Tlingit Tribe

ORGANIZATIONS

Alaska Co-op Extension
Alaska Forest Association, Inc.
Alaska Society of Forest Dwellers
Alaska Timberline Corp.
Alaska Women in Timber
Alaskans for Responsible Resource Management
Angoon Community Association
CARE
Cascadia Wildlands Project
Earthjustice Legal Defense Fund
Forest Conservation Council
Glacier Grotto
Hydaburg Cooperative Association

Institute for Policy and Research
Karst Research Group
Ketchikan Advisory Committee
Ketchikan Chamber of Commerce
Ketchikan Visitors Bureau
Klawock Cooperative Association
POW Conservation League
Prince of Wales Loggers League
Sierra Club Legal Defense Fund
Sitka Conservation Society
Society of American Foresters
Southeast Alaska Seiners Assn.
Southern SE Reg. Aquaculture Assoc.
Tlingit & Haida Central Council
Tongass Conservation Society
West Naukati Homeowners Assoc.
Whale Pass Homeowners Assoc

BUSINESSES

Adventure Alaska Southeast
Age Cedar Products
Basic Transportation Co.
Bear Valley Lodge
Bishop Log Salvage
Black Bear Cedar Products
Blue Lagoon Oyster Farm
Boardwalk Wilderness Lodge
Boyer Alaska Barge Line
Byron Brothers Cutting
Cape Fox Corporation
Construction Machinery, Inc.
Cove Lumber
Dames and Moore
Deer Creek Cottage
Doug Wilhite Riverguide
Durrette Construction
FlyQuest Adventures
Forestry Sciences Lab
Garcon Enterprises
Gateway Forest Products
Haida Corporation
Hamar Sawmill
Harding's Custom Specialty Woods
Harza Engineering

Hedges B & B
Herrera Environmental Consultants
J&J Charters
J&S Timber Company
Kavilco, Inc.
Ketchikan Daily News
Ketchikan Gateway Borough
Klawock Heenya Corporation
LB Logging
Mariner, Inc.
McFarland's Floatel
Miller Shingle Company, Inc.
Mono. Acq. Svc.
Mountain Man Cutting
Naukati Adventures
North Star Cedar
Oceanview RV Park
Pacific Log and Lumber
Petersburg RD
Petro Alaska, Inc.
Reid Brothers Logging and Construction Inc.
Robertson, Monagle & Eastaugh
Schmolck Mechanical Contractors
Seaford Construction
Sealaska Corp.
Sealaska Timber
Shaan-Seet, Inc.
Silver Bay Logging
Southeast Exposure
Southeast Stevadoring Corp.
Thorne Bay, Co.
TRUCO
Welser Sawmill
Whales Pass Resort
Wilks Logging
Wooden Wheel Cove Lodge
Wrangell Cooperative Association
Ziegler, Cloudy, King & Petersen

RESIDENTS AND INDIVIDUALS

A total of 210 residents and individuals are included in the project mailing list.

Appendix A

Transportation Engineering Report

TRANSPORATION ENGINEERING REPORT

SANDY BEACH ROAD RECONSTRUCTION EA

CONTRACT NUMBER: 53-0109-6-00420; TASK ORDER 0116-01-04

Prepared for:

USDA FOREST SERVICE
Tongass National Forest
Thorne Bay Ranger District

and

HARZA ENGINEERING COMPANY
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Prepared by:

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August 30, 2001

Greg J. Zartman
Transporation Engineer

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Project Manager

Robert Wetherell
Contracting Officer's Representative

TABLE OF CONTENTS

APPENDICES

LIST OF FIGURES

LIST OF TABLES

1.0 INTRODUCTION

1.1 REPORT OBJECTIVES

This report address three transportation engineering issues and options associated with the reconstruction / construction of the Sandy Beach Road including design elements and standards, construction issues, construction costs, and associated public issues.

1.2 LOCATION

The Sandy Beach Road (FDR 30) extends approximately 21 miles from Thorne Bay to the Coffman Cove Road along the east coast of Prince of Wales Island. The road turns inland near Ratz Harbor climbing to an alpine pass and then falling back to a "Tee" junction with connections to the Hatchery-Y at the west and the community of Coffman Cove at the east (FDR 3030). The most direct route from Thorne Bay to Coffman Cove, via FDR 30 and FDR 3030, is approximately 36 miles. The alpine pass on this route is blocked by snow seasonally.

The entire area is within the Thorne Bay Ranger District.

1.3 APPLICABLE STANDARDS, GUIDELINES, AND REGULATIONS

The plans were prepared to comply with the following:

- The National Environmental Policy Act (NEPA) of 1969, as amended,
- American Association of State Highway and Transportation Officials (1994),
- Council on Environmental Quality Regulations (40 CFR Parts 1500-1508),
- Forest Service Procedures for Implementing CEQ Regulations (FSM Chapter 1950 and FSH Chapter 1909.15),
- The National Forest Management Act (NFMA) 1976,
- The Tongass Timber Reform Act (TTRA),
- Alaska National Interest Lands Conservation Act (ANILCA),
- Alaska Coastal Management Program (ACMP), and
- Forest Service Soil and Water Conservation Handbook (Best Management Practices),
- Tongass National Forest Modified Land and Resource Management Plan (TLRMP) (1997)/

1.3 USE OF REPORT

This purpose of this report is to aid the Interdisciplinary Team in creating the Environmental Assessment(EA) document for this project. This report should be used as supporting and not intended to address all design and construction issues associated with the implementation of this project. Further survey, analysis, and design will be required to implement the Sandy Beach Road Reconstruction.

2.0 FIELD INVESTIGATION

2.1 OVERVIEW

A cursory field investigation of the project area was performed during the week of February 12, 2001. During this field investigation, the project transportation engineer drove approximately 55% of the road segments being analyzed in the Sandy Beach Road Reconstruction EA. The primary intent of the field investigation was to gain a certain level of local knowledge of the project area, terrain features, resource issues, existing road characteristics, local construction practices, and material sources. Site specific location information, design / construction recommendations, or resource data were not collected during this field investigation.

2.2 SITE SPECIFIC OBSERVATIONS

Observations of various aspects of the proposed routes were taken during the field investigation. Of particular concern were drainage structures, segments of road containing steep terrain with poor horizontal alignment, and rock sources.

2.2.1 Drainage Structures

Bridge crossings were an item that was identified early in the project by the Interdisciplinary Team for observation during the field investigation. The following major bridge crossing were observed in the field:

- *Slide Creek Bridge:* This one-lane width bridge consists of a concrete I-beam superstructure with a concrete slab deck and sawn timber abutments.
- *Barren Creek Bridge*: This one-lane width bridge consists of a concrete I-beam superstructure with a concrete slab deck and sawn timber abutments.
- *Sal Creek Bridge:* This two-lane width bridge consists of a glue laminated beam superstructure with a sawn timber deck and sawn timber abutments.
- *Little Ratz Creek Bridge:* This one-lane width bridge consists of a glue laminated beam superstructure with a sawn timber deck and sawn timber abutments.
- *Ratz Creek Bridge:* This one-lane width bridge consists of a steel I-beam superstructure with a sawn timber deck and sawn timber abutments.
- *Bridge approximately 0.1 miles north of the Ratz Creek Bridge:* This one-lane width bridge consists of a steel I-beam superstructure with a sawn timber deck and sawn timber abutments.

2.2.2 Segments of Poor Horizontal Alignment on Steep Terrain

Three road segments were noted to consist of poor horizontal alignment on relatively

steep terrain:

The first segment, starting approximately three miles south of Little Ratz Harbor, is approximately two miles in length and was observed to contain multiple small radius (less than 100 feet radius) curves on slopes up to 90%.

The second segment, south of Big Lake, is approximately 1.5 miles in length and contains poor alignment on slopes up to approximately 75%.

The third segment begins approximately 1.5 miles north of segment two and continues north fro approximately 4 miles. Steep slopes combined with terrain highly dissected with v-notices produce a section of very poor horizontal alignment.

All three segments summarized above are anticipated to require a high level of reconstruction to achieve design speeds. (see Appendix 1)

2.2.3 Rock Sources

Abundant rock sources are available along the entire length of road observed during the field investigation. The potential for further development of these sources appeared to be favorable. The smaller rock pits would not support a rock crushing unit, but larger sites with sufficient area for this equipment were noted throughout the project area. Access to all sources was noted as being fair to good.

2.3 LOCAL CONSTRUCTION PRACTICES

As part of the field investigation, a certain amount of time was spent observing local construction activities on road segments similar to those being considered in the Sandy Beach Road Reconstruction EA. Specifically, three aspects of construction practices where observed: equipment staging areas, overall construction procedure, and equipment.

2.3.1 Equipment Staging Areas

Local construction crews utilize forest spur roads, rock pits, relic logging landings, and other existing flat open areas that had been previously surfaced with some sort of aggregate. The need to construct staging areas on these types of projects appeared unlikely.

2.3.2 Construction Technique

Road construction technique consists of a five-step process:

1. Mechanical and/or hand clearing of road ROW vegetation and hauling of this vegetation to a stable disposal site.
2. Excavation of the organic soil layer to suitable material and haul of this organic material to a stable disposal site.
3. Drilling and shooting of any underlying rock to form the basic geometry of the desired road prism. Excess shot rock is hauled to a stable disposal site or used elsewhere in the road project.
4. The prism is mechanically leveled and the subgrade formed. When suitable material is not available on site, it is hauled in from a suitable source or from other segments in the project.
5. Surface material is hauled in and mechanically spread.

2.3.3 Equipment

A standard excavator and a 10 cubic yard dump truck are the common pieces of equipment used for most aspects of the road construction project. A variety of other support and special purpose equipment types are also used, but in a smaller capacity.

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3.0 ROAD CONSTRUCTION / RECONSTRUCTION

The U.S.D.A. Forest Service, recognizing that Forest Development Road use for purposes other than management of the timber resource is becoming a significant concern, wishes to upgrade portions of the Prince of Wales Island system to support both heavy equipment use (i.e., 160,000lb max. GVW) and use by standard highway vehicles (i.e., 80,000lb max. GVW). This section discusses design elements and standards, construction issues, and public concerns associated with undertaking such an action.

3.1 EXISTING ROAD CONDITION

The current road was constructed for as a single lane road for logging equipment and log truck haul in segments from logging camps in Coffman Cove and Thorne Bay. The beach road between Thorne Bay and Little Ratz Harbor has been graveled.

Traffic forecasts include both industrial traffic and recreational vehicles. The established load limits for Forest Service roads is twice the normal load limit for the State of Alaska highways, at 160,000 pounds for a 5-axle truck. Tracked vehicles up to L-90 loadings are currently permitted. No lugs or similar extrusions are permitted for either wheeled or tracked vehicles.

Regular snow plowing has not historically been performed on the Sandy Beach routes. Some snowplowing by the City of Thorne Bay to the Sandy Beach recreation site a few miles north of Thorne Bay is anticipated.

3.2 DESIGN ELEMENTS AND STANDARDS

Design elements are those factors that exert the control by which a road is designed and construction. AASHTO classifies design elements for highways and streets into five major categories: Sight Distance, Horizontal Alignment, Vertical Alignment, Combination of Horizontal and Vertical Alignment, and Other Elements Affecting Design. Design standards are those physical characteristics of the designed (constructed) road the meet the objectives of design elements (e.g., road running surface width, cut slope, fill slope, and road surface type).

Due to anticipated low average daily traffic (ADT) values for the Sandy Beach Road, use of the road by heavy logging and construction equipment, and multi-use passenger vehicles, standard highway design is not readily applied to this project. AASTHO defines a specific classification of road for this type of use, mixed vehicle traffic, and low ADT: The Special Purpose Road. The Special Purpose Road is defined as roads that include recreational roads, resource development roads, and local service roads that are lightly traveled at relatively low speeds by wide range of vehicle types.

3.2.1 Design Elements

To simplify the application of design element to road design and construction procedures, this discussion will relate these elements to the desired design speed for proposed road segments.

Sight Distance

From AASTHO, sight distance is the length of roadway ahead visible to the vehicle operator. As a minimum, this distance should be sufficiently long to enable a vehicle traveling at or near the design speed to stop before reaching a stationary object in its path. For Special Purpose Roads AASHTO recommends that sight distance at every point along the roadway be at least that required for the below-average driver or vehicle to stop within this distance.

It is anticipated that sight distance will play major role in the design and re-construction/construction of the Sandy Beach Road, through design speeds, levels of excavation, and safety. From figure 1, it can be seen that an increase in design speed from 20 mph to 30 mph results in a 72% increase in the required safe stopping distance on wet asphalt or wet packed gravel. Increased stopping sight distance results in an increase in construction / reconstruction effort on segments containing poor alignment.

Roads constructed as two lane verse one lane can also have a significant influence on stopping sight distance. The designer must consider the situation where two vehicles meet on a given road segment. To provide for safe stopping of both vehicles, the designer must double the stopping sight distance. This is due to the relation between stopping sight distance and design speed(see figure 1) and the relative speed of two vehicles approaching one another. As two vehicles approach one another, traveling at the same design speed, their relative speed is double the design speed they are traveling. From figure one, notice that stopping sight distance increases from 50 feet to 100 feet for a design speed that increases from 10 mph to 20 mph.

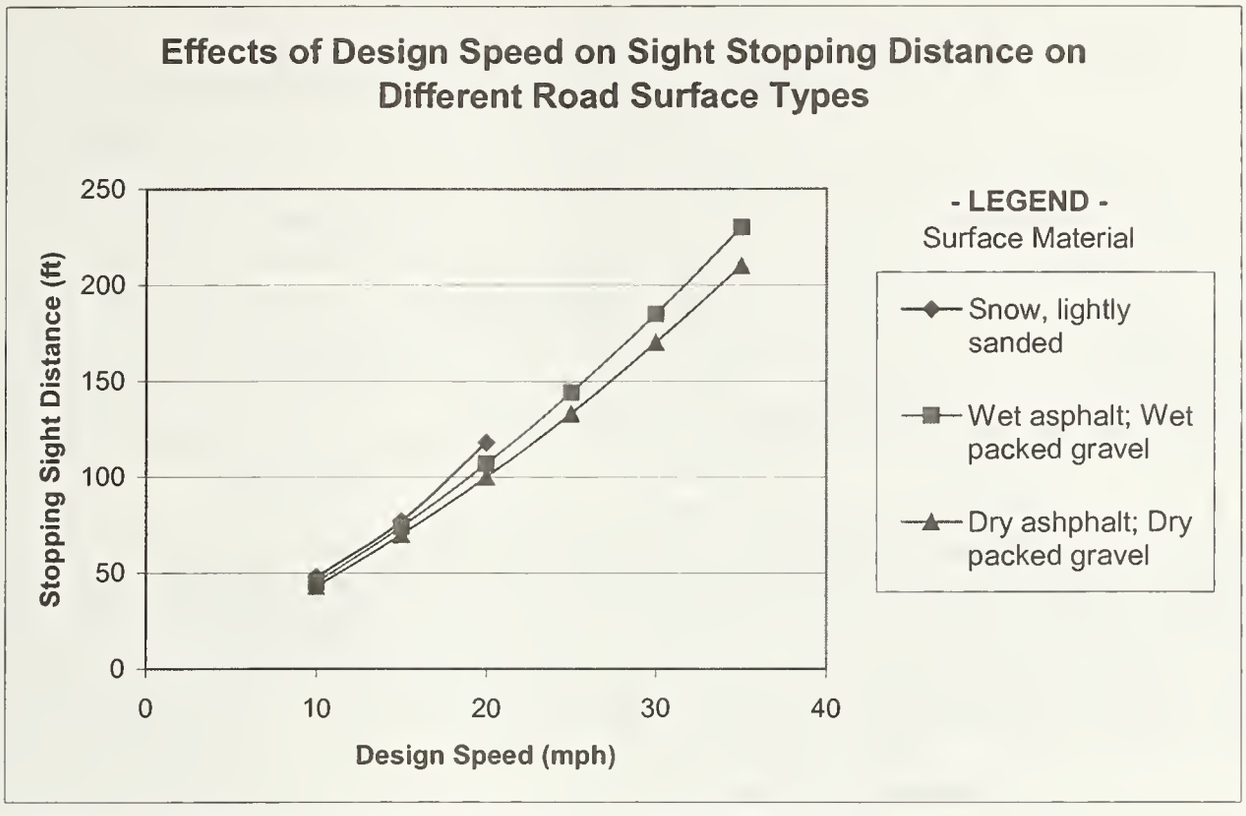

Figure 1 : Effects of Design Speed on Sight Distance.

Horizontal Alignment

Horizontal alignment is the term that describes the influence of road curvature on travel(design) speed and sight distance (see figure 2). Of specific concern on the Special Purpose Road, is the ability to maintain stopping sight distance across horizontal curves. Sight obstacles such as road cut banks and vegetation commonly reduce sight distance below minimum stopping distances for given design speeds. Minimizing this effect on Special Purpose Roads often involves increasing road right-of-way clearing or cut bank excavation to meet minimum sight distance requirements.

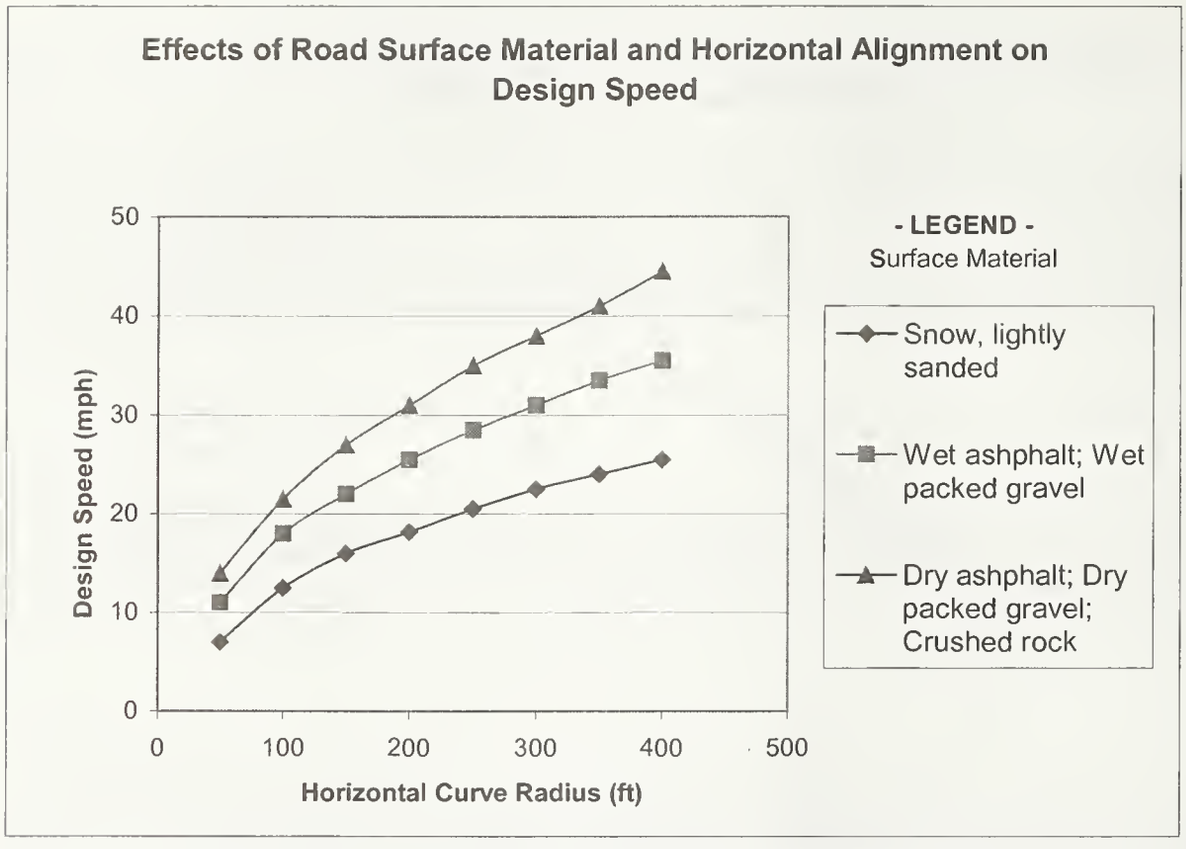

Figure 2: Effects of Road Surface Material and Horizontal Alignment on Design Speed.

Vertical Alignment

Vertical alignment is the term that describes the combination of road grade, changes in these grades, and associated vertical curves on a given road segment. This element can have major influence on many aspects of a road project. Not only does vertical alignment affect sight distance and design speed, but it can also have significant influence on aspects such as drainage and surface erosion, and therefore maintenance costs. When road grades are in excess of 15% favorable and 11% adverse, vertical alignment tends to be the design element that governs design speed.

Of further concern is the influence of vertical alignment on road surface material. Steep road grades may require that the designer pay special attention to the type of surfacing used to maintain road integrity and minimize maintenance costs through surface erosion.

Combination of Horizontal and Vertical Alignment

This design element combines the effects of both horizontal and vertical alignment. Effects of this design element are most profoundly shown in sight distance. Road design that does not adequately take this element into account can result in a disjointed sight effect. This occurs when a driver approaches the crest of a vertical curve, and viewing over the crest, sees a horizontal curve on the other side of the vertical curve before seeing the road directly beyond the crest of the vertical curve. Not only does this significantly reduce sight distance, but it also can pose a significant safety issue. On-coming vehicles can be nearly unseen on a disjointed curve situation.

Proper design procedures that address the combination of horizontal and vertical alignment are essential to the success of a road project. Correcting road segments that do not address the disjointed sight effect can be very difficult and costly. Due to relatively steep slopes and dissected terrain along various segments of the proposed Sandy Beach Road route(s), disjoined sight effect will likely play a major role in design and construction.

Other Elements Affecting Design and Construction

These elements tend to have much less impact on road geometry and more on overall road cost. They include drainage, erosion control and landscape development, signing and marking, and maintenance of traffic through construction areas. Of these, it is anticipated that drainage and erosion control will result in the greatest cost impact on the Sandy Beach Road project. Constraints exerted through fish passage regulations and water quality concerns (i.e., Forest Service BMP's) will result in design and construction practices that are significantly more costly than those used to construct the existing road segment. Examples include the use of open bottom drainage structures to meet fish passage regulation and slope protection.

3.2.2 Design Standards

Four design scenarios were considered for construction / reconstruction of proposed Sandy Beach Road routes. These scenarios and the associated design standards include:

Scenario 1 (One-Lane with turnouts, aggregate surface)

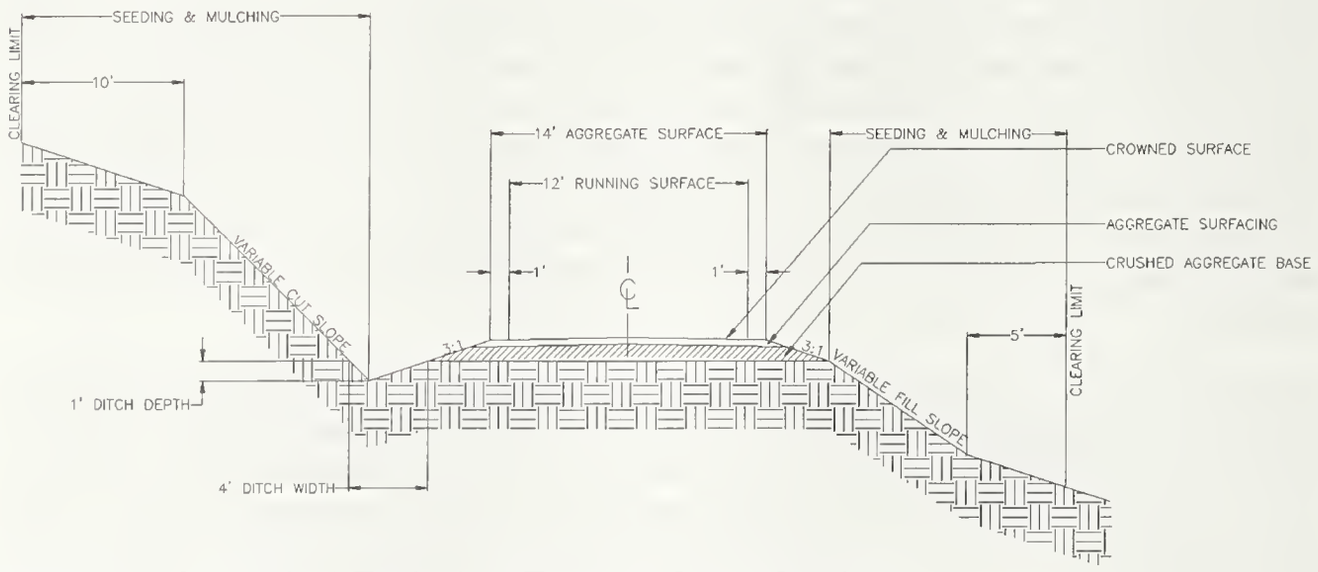

Figure 3: Scenario 1 Typical on Tangent Cross-Section

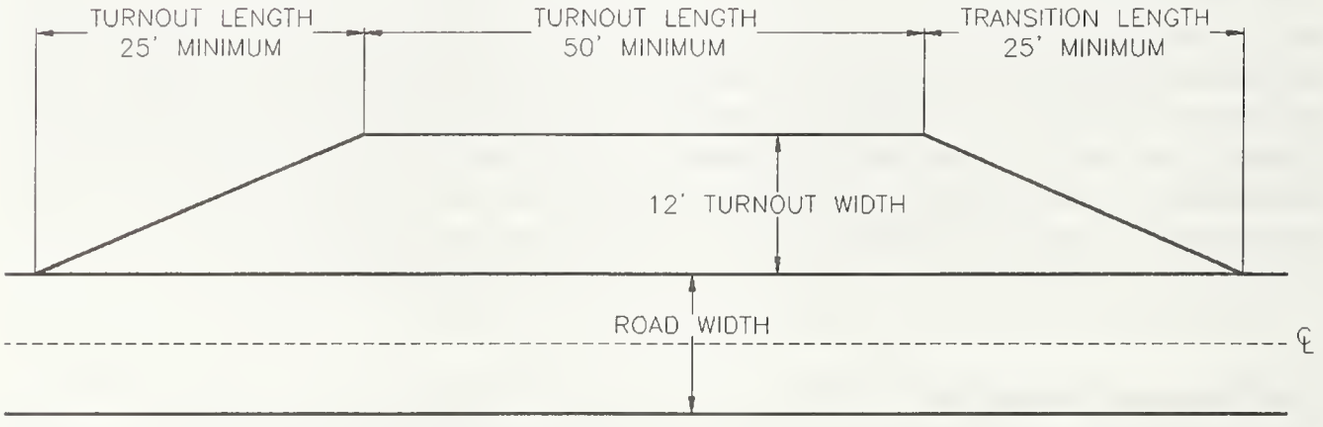

Figure 4: Typical Turnout, Plan View

Scenario 2 (One-Lane with turnout, asphalt surface)

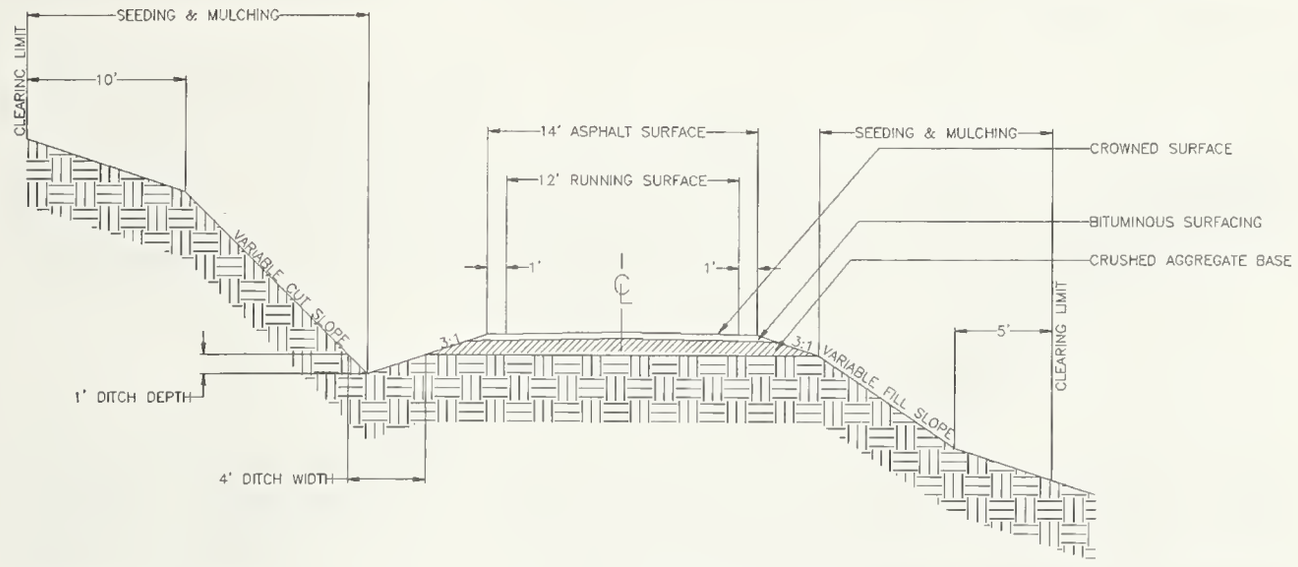

Figure 5: Scenario 2 Typical on Tangent Cross-Section

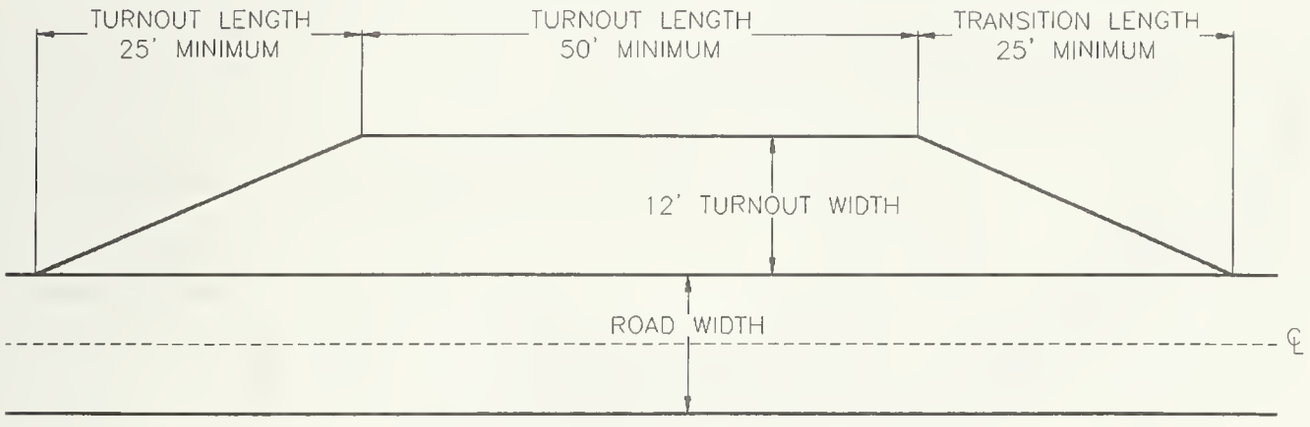

Figure 6: Typical Turnout, Plan View

Scenario 3 (Two-Lane, aggregate surface)

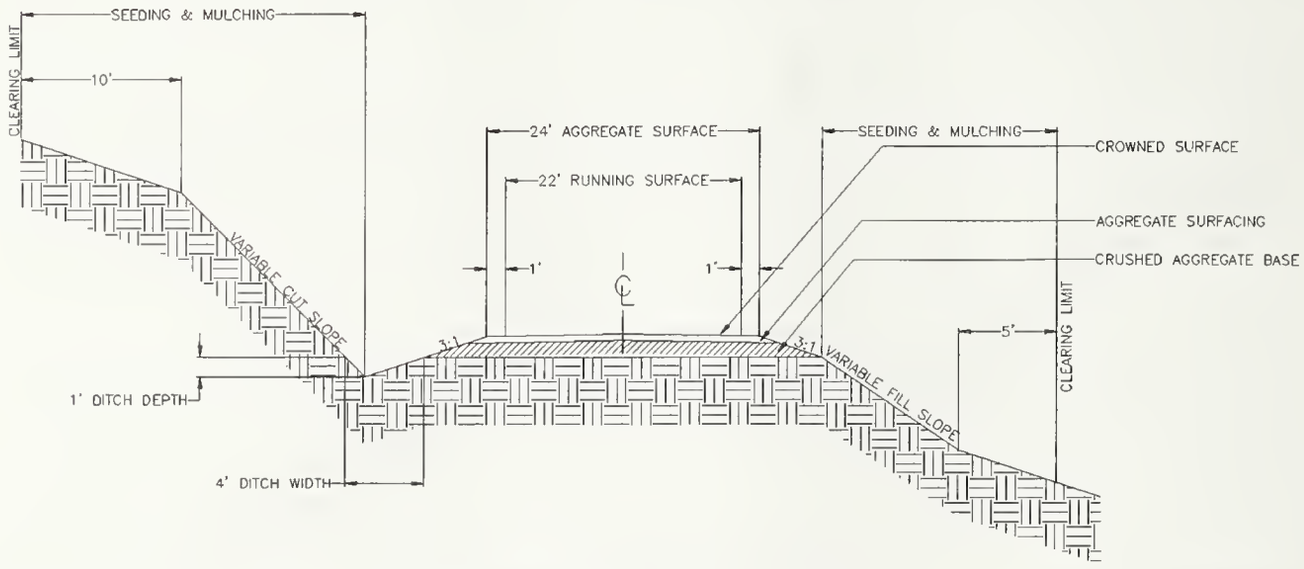

Figure 7: Scenario 3 Typical on Tangent Cross-Section

Scenario 4 (Two-Lane, asphalt surface)

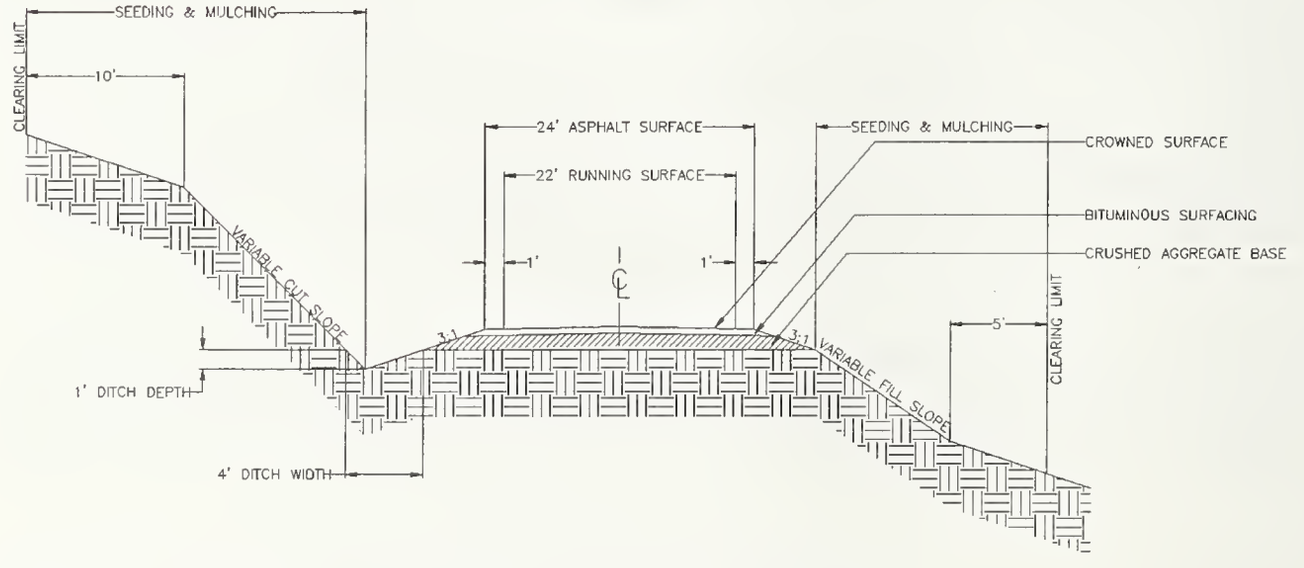

Figure 8: Scenario 4 Typical on Tangent Cross-Section

For all construction scenarios, minimum vertical and horizontal curves should be designed on a site by site basis taking into account the design and critical vehicles, sight stopping distance, and horizontal and vertical alignments.

3.3 DRAINAGE STRUCTURES

Drainage structure design and construction will likely be a significant component of the Sandy Beach Road project implementation and cost. Of specific concern are crossings requiring design to meet fish passage regulations, upgrade / replacement of current bridge crossings, and the effect of moving to a two lane road travel way.

3.3.1 Fish passage compliant drainage structures

Design of stream crossings identified as requiring compliance with fish passage regulations will be to the standards and guidelines specified in Alaska State Statue Title 16. Drainage structures meeting the criteria detailed in Title 16 include open bottom arches, slab bridges, and weir/baffle culverts. An example of a common fish passage compliant structure is as follows:

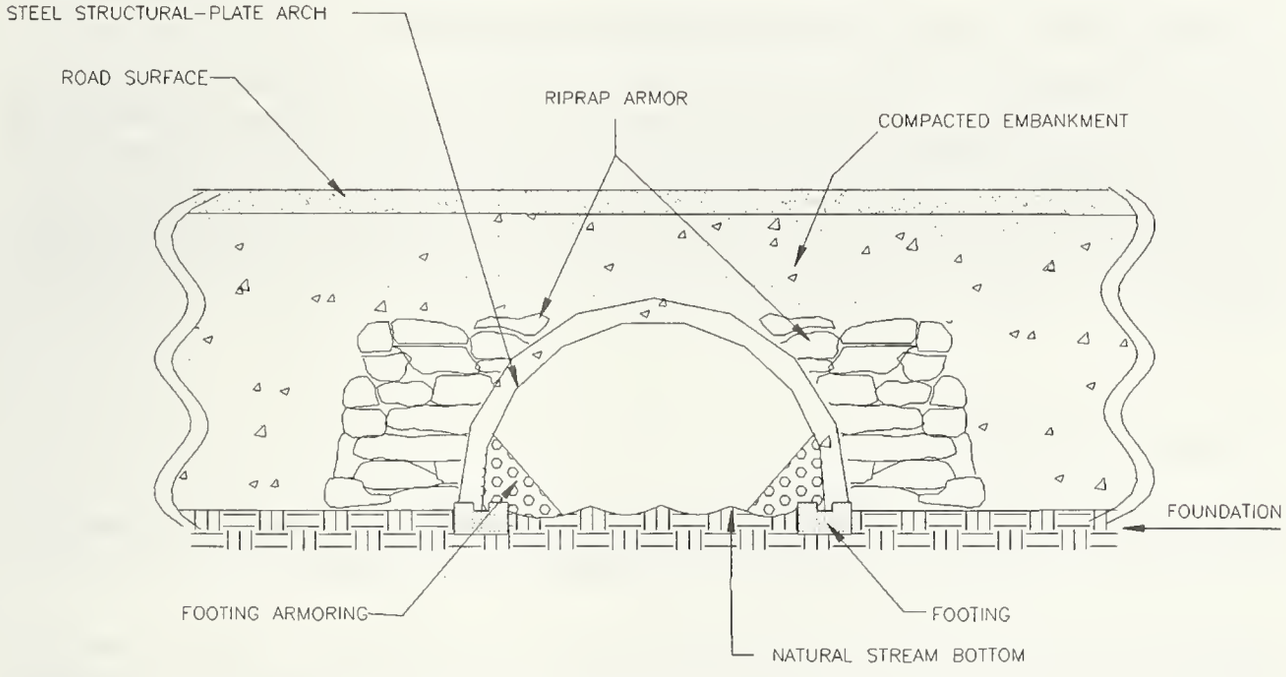

Figure 9: Fish Passage Drainage Structure

3.3.2 Bridge Crossings

The existing Sandy Beach Road routes currently contain 8 significant bridge crossings, only one of which has a two lane deck width. It is anticipated that for single lane construction scenarios, inspection of these spans and evaluation of the current load

rating will be performed to insure they are sufficient to meet construction / reconstruction objectives. Two lane construction scenarios will require that certain bridges be upgraded through widening of the abutments, superstructure, and deck. Where upgrades are not feasible bridges will be need to be replaced with a new two lane structure. The following table details anticipated bridge replacement and upgrade needs.

Table 1: Bridge upgrade or replacement to two lane standards

Bridge	Mile Post	Road	Upgrade	Replace
Slide Creek	23.76	30	Yes	
Barren Creek	24.48	30	Yes	
Sal Creek	28.83	30	na[1]	na[1]
Little Ratz	34.02	30		Yes
Big Ratz	37.75	30	Yes	
Little Lake	37.88	30	Yes	
Luck Creek	45.30	30	Yes	
Eagle Creek	1.00	3030100	Yes	

[1] Existing two lane bridge; no upgrade or replacement required

3.3.3 Two Lane vs. One Lane Construction Options

Constructed lane width will have a significant influence on drainage structure cost. One lane construction scenarios will require that only those structures identified for replacement due to fish passage concerns, or those reaching the end of their service life, will actually be replaced. Two-lane scenarios will require that all structures, with the exception of certain bridges detailed above, be replaced. Extending existing structures to a width that a two-lane road would likely be infeasible and/or cost prohibitive.

3.4 ROAD SURFACING

Two surfacing options, crushed aggregate rock and hot mix asphalt concrete, are considered for use in all reconstruction / construction scenarios.

Aggregate surfacing has a lower initial cost, whish is somewhat offset by the ongoing maintenance costs through grading and periodic resurfacing required as aggregate breaks down or is lost. The breakdown of aggregate contributes as a nonpoint source of sediment released into streams. Aggregate can be manufactured close to the job site using a portable rock crusher with rock obtained from pits located adjacent to the existing road system.

Although more costly, asphalt surfacing has several advantages over aggregate surfacing. A smoothed travel way, with painted centerlines and fog lines, enhances the quality of ride and safety for vehicle occupants. A sealed surface provides dust

abatement and reduced sediment delivery. The asphalt surface requires less maintenance than an aggregate surface and is more resilient to the effects of snowplows during snow removal operations. A portable plant would be required to produce asphalt if a permanent plant is not located locally.

There is little effective difference in the design speeds of asphalt and packed aggregate surfaced roads for any given alignment. Although design speed changes for differing weather conditions (wet or dry surface), the effect of the different surfacing materials does not. See figure 2.

3.5 BEST MANAGEMENT PRACTICES (BMP)

Practices used for the protection of water quality. BMP's are designed to prevent or reduce the amount of pollution from nonpoint sources or other adverse water quality impacts while meeting other goals and objectives. BMP's are standards to be achieved, not detailed or site specific prescriptions or solutions. BMP's as defined in the USDA Forest Service Soil & Water Conservation Handbook are mandated for use in Region 10 under the Tongass Timber Reform Act.

3.6 CONSTRUCTION ISSUES

Muskegs

Road realignment should avoid crossing muskegs and other wetlands if at all possible, while still adhering to controlling design elements and standards. Where muskegs are crossed, the road should be constructed allowing the natural cross drainage to be maintained.

A commonly used road construction technique is to float the road across the surface of a muskeg. A layer of rock, several feet deep, is placed directly on the undisturbed sod/root mat, or if especially soft, on a log corduroy or geotextile base. Settlement of the floating subgrade over the years varies depending on the depth of the underlying muskeg. The flexible nature of the floating subgrade is adequate for aggregate surfaced roads which can be periodically graded back into shape and resurfaced following settling. However, the irregular settling makes this construction technique unsuitable for use in supporting a asphalt paved road surface.

A stable subgrade for a asphalt paved road across muskeg is achieved by excavating unsuitable material down to a stable base of competent material and backfilling, usually with shot rock. Excessively deep muskegs are partially excavated and backfilled with rock.

Full bench sections

Where side slopes are too steep to support a fill slope, the entire road bed must be built on an excavated bench. This usually occurs on slopes in excess of 50%. Excavated material is hauled to a stable waste site or placed in portions of the road requiring fill material, thus avoiding side-casting on steep slopes. Full bench cuts typically result in high cut banks, exposing a significant area of mineral sole to erosion potential. In these situations, appropriate erosion control measures should be employed. High cut banks can also have high visual impact.

Rock pits

It is anticipated that existing rockpits will be reactivated for use in reconstruction / construction. The 6 mile segment of new road construction between Ratz Harbor and Eagle Creek will require the establishment of new rock pits at intervals along the length of construction.

Construction Timing

Reconstruction operations should be timed to adhere to Alaska State Statute Title 16.

Traffic control/road closure during reconstruction

Public access to roads may be restricted, and some roads closed to public use during reconstruction operations.

3.7 PUBLIC ISSUES

Public comments, as they relate to transportation engineering, are addressed as follows.

Issue 1

Improve safety and convenience (including "quality of ride") of travel in the project area.

--*Discussion*: Safety and convenience are a measure of the design speed and safe sight distance associated with the design and construction of a given road segment. Safety relates directly to the ability of the driver to avoid collision. This ability to avoid collision is quantified in terms of stopping sight distance, or the sight distance required to identify an object, react to the object, and then stop the vehicle before reaching that object. Convenience can be related to design speed. Higher design speeds result in decreased travel time and therefore increased driver convenience

--*Existing Condition*: The existing transportation system segments considered in the document were originally designed and constructed to function as access for management of the timber resource. Consequently the design elements and standards used in the design and construction of these segments does not identify safety and convenience as primary issues. The existing routes, with their lower design speeds and decreased sight stopping distance due to one-lane construction and sections of poor horizontal alignment, do not currently meet convenience and safety objectives of the multi-use driver.

The most direct existing route between Thorne Bay and Coffman Cove (followed by Alternatives 3 and 4) contains significant sections of low speed road resulting in driving times of 1 3/4 to 2+ hours. When snow blocks the alpine pass traversed by this route access to Coffman Cove is via FH 42, 43 and 44. Travel time is 2 – 3 hours.

--Application of Alternatives: Proposed reconstruction alternatives for the Sandy Beach Road from Thorne Bay to Coffman cove will address both the resource management vehicle and the multi-use vehicle. This will result in design elements and standards that more directly address convenience and safety through increased design speed and increased sight stopping distance.

Under the proposed construction scenarios for alternatives 3, 4 and 5, travel time from Thorne Bay to Coffman Coved is expected to be about 1 hour. Alternative 2 will have a travel time of approximately 1 hour 20 min.

Table 2: Typical Travel Time (minutes), Thorne Bay to Coffman Cove

Alternative	Approximate Travel Time (min)
1	110
2	80
3	65
4	65
4 mod	60
5	60

Issue 2

Provide year-round, all-weather access between Coffman Cove and Thorne Bay via a shorter, more direct route.

--Discussion: All weather travel between Thorne Bay and Coffman Cove can be provided through the use of routes that do not experience significant snow accumulations or through plowing of routes that do experience snow accumulations to a level that prevents vehicle travel. The first of these options does not require special consideration from a design standpoint, as all-weather access is intrinsic in the location of the route. The later option requires that the designer account for plowing of routes that experience excessive snow accumulations. This accomplished though the use of asphalt paving of the segments anticipated to require plowing. Plowing of segments surfaced with crushed aggregate could be done on a seasonal schedule (e.g., twice a year), but not on a regular basis due to potential degradation of road surfacing and possibly the road subgrade.

--Existing Condition: Current winter travel between Thorne Bay and Coffman Cove is accomplished via FDR 20. The existing Sandy Beach route (i.e., FDR 30) typically receives snow accumulations on various segments to a point that typically prevents vehicle travel. Winter travel time from Thorne Bay to Coffman cove, via FDR 20, is approximately 3 hours.

--Application of Alternatives: Construction scenarios proposed in the action alternatives provide two options for all weather travel: a route that should typically experience minimal snow accumulations and routes that would support regular plowing.

Table 3: Typical Winter Travel Time (minutes), Thorne Bay to Coffman Cove

Alternative	Approx. Travel Time (min)	All Weather Access Description
1	180	Access via FDR 20 to FDR 3030
2	130	Regular snow plowing of high elevation segments
3	100	Regular snow plowing of high elevation segments
4	180	Access via FDR 20 to FDR 3030 (regular plowing of alt. 4 route not recommended)
4 mod	180	Access via FDR 20 to FDR 3030 (regular plowing of alt. 4 route not recommended)
5	95	Low elevation, minimal snow accumulation

Issue 3

Meet increased demand expected to result from new ferry terminal.

--Discussion: The Inter-Island Ferry Authority (IFA) plans a ferry terminal located at Coffman Cove. Traffic from the ferry is expected to be seasonal. Meeting the increased demand would mean that the road must handle the expected density of traffic.

--Existing Condition: Travel out of Coffman Cove is predominately accomplished via FDR 3030 to FDR 20. ADT levels measured in 1996 (48 ADT), and extrapolated to 2021 (120 ADT), for this segment fall below the 300 ADT level stated in AASTHO as being critical to design. Due to weather induced limitations and low design speeds associated with the existing Sandy Beach route, it is anticipated that ferry traffic would not choose to travel this route.

--Application of Alternatives: Due to estimated low future ADT levels, it is anticipated that proposed action alternatives would influence ferry traffic in the same way that it would local traffic: safety and convenience.

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4.0 ECONOMICS

The reconstruction effort required to upgrade each road's existing alignment to meet new design standards was evaluated following cursory field evaluation, GIS and photo analysis. Individual road segments were given a reconstruction ranking of Low, Medium or High based on current alignment, average side slope, and other parameters, to reflect a relative level of reconstruction. An average road geometry was assumed for each reconstruction class allowing an earthworks estimate to be calculated by class for each road template (one lane or two lane) considered in the analysis. Distances used were obtained from GIS.

The Forest Service costing guide approach was used in the costing of the project. Costs, derived from the Forest Service Region 6 Cost Estimating Guide For Road Construction and local experience, were applied to roadbed reconditioning, earthworks and haul, replacement of drainage structures (including bridges), the procurement and placement of rock, aggregate, and pavement, design and staking, equipment mobilization, etc. A segment unit cost was developed for each reconstruction scenario (one lane gravel, one lane paved, two lane gravel, two lane paved) given the level of reconstruction (Low, Medium, High) required. The segmented unit cost approach allowed for flexibility in costing the various combinations of roads (routes) and reconstruction scenarios used in the alternatives.

Estimated total reconstruction costs are shown in Table 4 and include the cost of 6 miles of new construction in Alternative 5. The costs of replacing and/or upgrading crossing structures such as bridges and culverts are included in the totals for each alternative.

Table 4: Estimated total reconstruction costs (in millions)

Alt 1	Alt 2	Alt 3	Alt 4	Alt 4 mod	Alt 5
No action	$ 25.3	$ 21.8	$ 21.6	$14.7	$ 8.8

Periodic grading of the gravel surfaced road segments of Alt 4, Alt 4 mod and Alt 5 will add an annual maintenance cost of $16,000, $50,000 and $58,000 respectively. The most direct route on existing roads from Thorne Bay to Coffman Cove has an estimated annual maintenance cost of $49,000. Eventually, these road segments will require resurfacing as the gravel surface is depleted.

The cost of snow removal operations should be added to Alternatives 2, 3, 4 and 4 mod, if all season access is desired across the alpine pass above Big Lake.

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5.0 REFERENCES CITED

1. American Association of State Highway and Transportation Officials, "A policy on Geometric Design of Highways and Streets," Washington D.C. 1994.

2. Kenneth B. Woods, Donald S. Berry, William H. Goetz, "Highway Engineering Handbook," McGraw-Hill Book Company, 1960.

3. U.S.D.A. Forest Service, "Forest Service Handbook No. 7700.56 – Road Preconstruction Handbook," 1987.

4. U.S.D.A. Forest Service, "Cost Estimating Guide for Road Construction," 1998.

5. U.S. Department of Transportation, "Coffman Cove Road EA," Thorne Bay, Alaska, 2000.

6. Brian Kramer, "A Road Design Process for Low Volume Recreation and Resource Development Roads," Department of Forest Engineering, Oregon State University, 1993.

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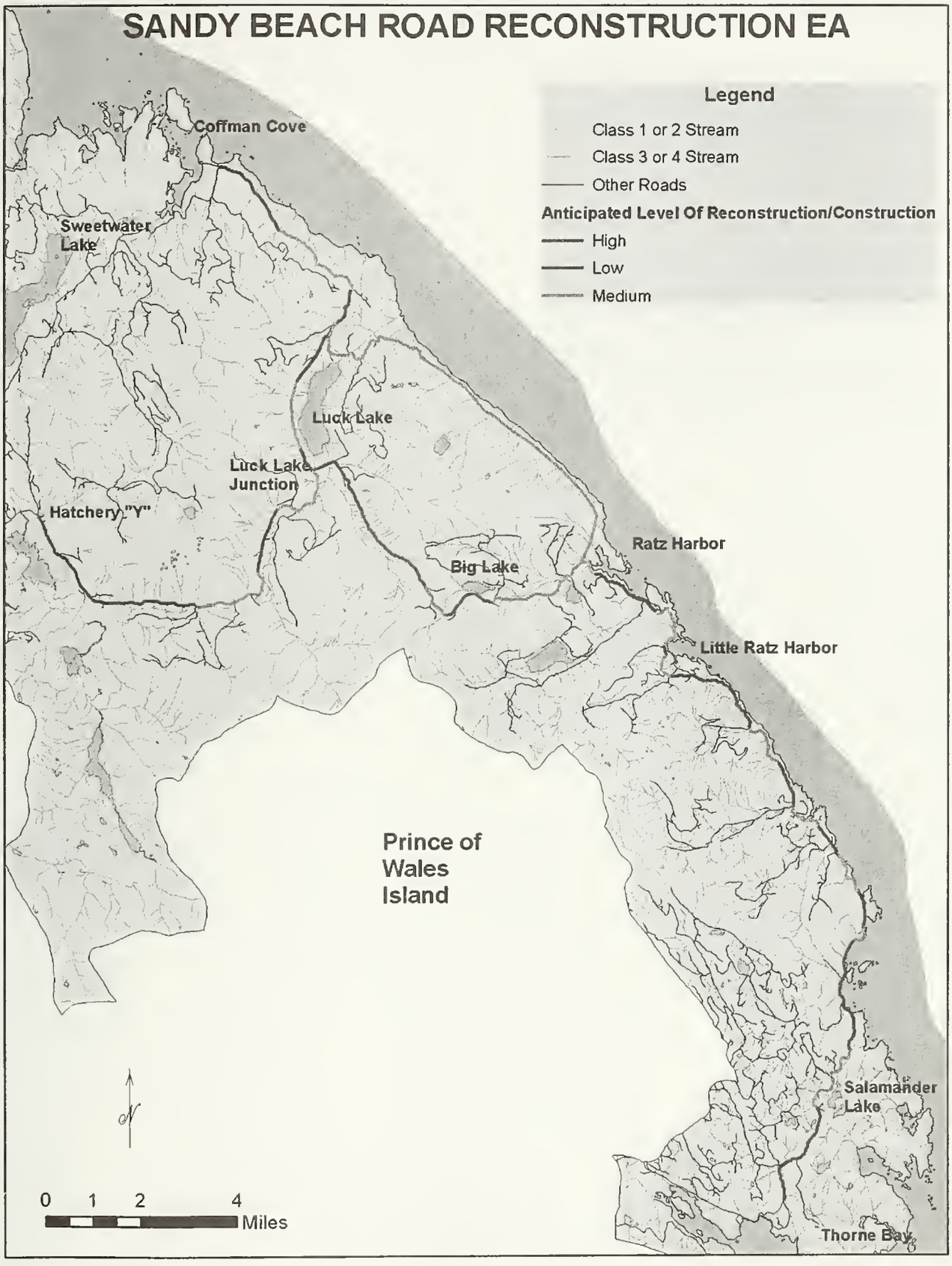
APPENDIX A: LEVELS OF CONSTRUCTION / RECONSTRUCTION



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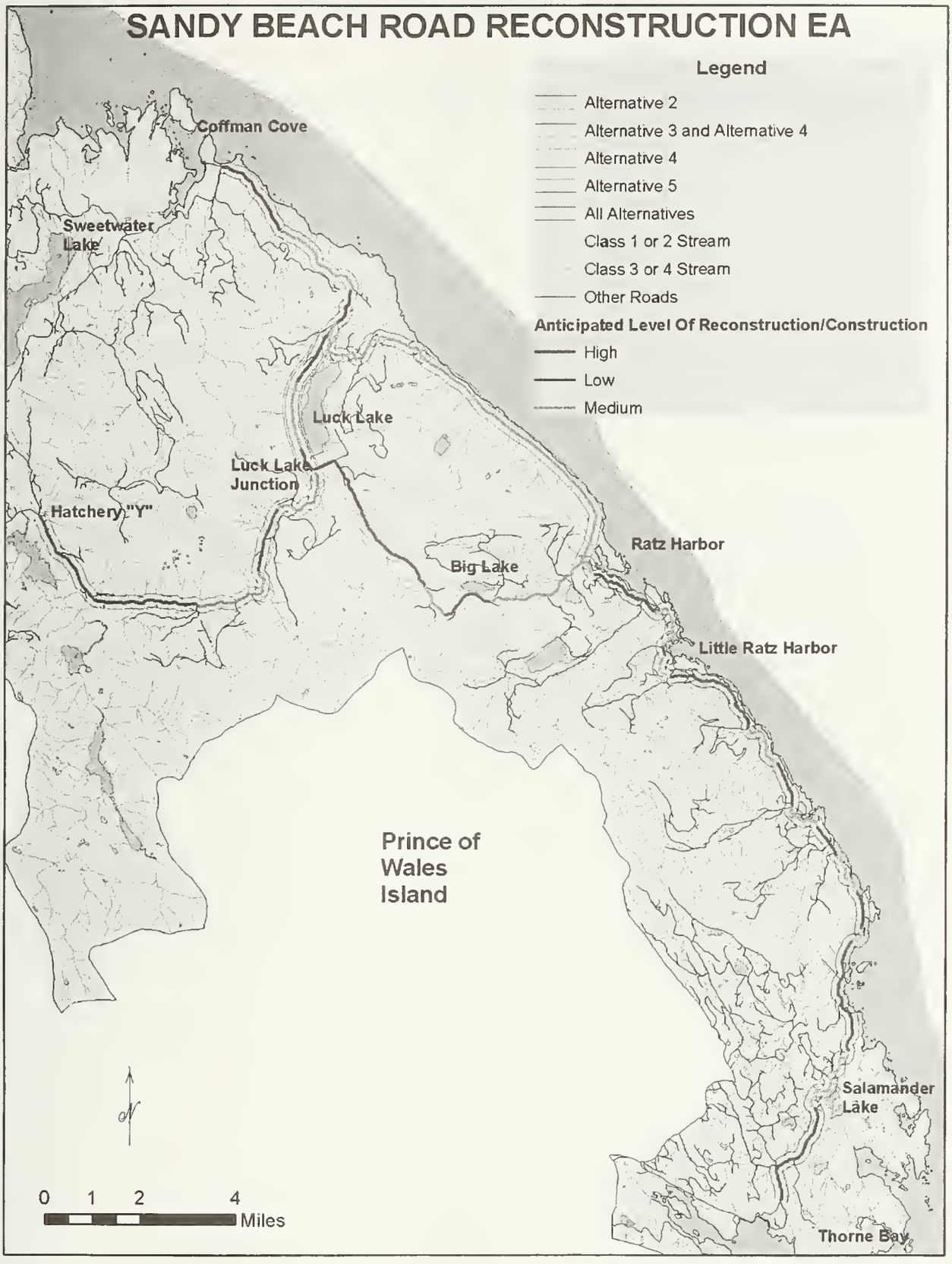
APPENDIX B: ALTERNATIVE MAP



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APPENDIX C: ABBREVIATIONS

- **AASTHO:** American Association of State Highway and Transportation Officials
- **ADT:** Average Daily Traffic
- **BMP**: Best Management Practice
- **FDR**: Forest Development Road
- **FH:** Forest Highway
- **GVW:** Gross Vehicle Weight
- **mph**: Miles Per Hour
- **ROW:** Right-of-Way

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Appendix B

Sensitive and Rare Plant Survey

Sandy Beach Road (FDR 30) Improvement Project
Sensitive and Rare Plant Survey
Prefield Review

Prepared for:

Thorne Bay Ranger District
Tongass National Forest

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Introduction

The Forest Service proposes to improve Forest Development Road 30 (FDR 30), also known as the Sandy Beach Road, between Thorne Bay and the junction with FDR 3030 at Luck Lake. In addition, improvements to FDR 30 and/or FDR 3030 between Luck Lake Junction and Coffman Cove may also be implemented. Several road improvement alternatives are being analyzed through the NEPA process. These alternatives include a no action alternative, action alternatives that involve differing road widths and surface treatments, and an alternative that would require construction of a new road between Ratz Harbor and Coffman Cove. Figures 2-1 through 2-5 contained in the Sandy Beach Road Reconstruction Environmental Assessment shows the location of the existing roads and the proposed road improvement alternatives.

This report summarizes existing information about sensitive and rare plant species occurrences in the project area. It also provides information on likelihood of occurrence and presence of potential habitat which can be used in design of field surveys.

Sensitive Plant Species

Table 1 presents the Regional Forester's List of Sensitive Plant Species as revised May 11, 1999. Sensitive species are those species for which population viability is a concern, as outlined in Forest Service Manual 2670. Only one plant species is federally listed or proposed by the U.S. Fish and Wildlife Service in Alaska. This species is *Polystichum aleuticum,* Aleutian shield fern, known only from Adak Island in the Aleutians and not expected to occur anywhere within the Tongass National Forest.

Table 1. Forest Supervisor's List of Sensitive Plant Species

Latin Name	Common Name	Occurrence on Thorne Bay Ranger District
Aphragmus eschscholtzianus	Eschscholtz's little nightmare	
Arnica lessingii ssp. norbergii	Norberg arnica	
Carex lenticularis var. dolia	Goose-grass sedge	suspected
Cirsium edule	Edible thistle	suspected
Dodecatheon pulchellum ssp. alaskanum	Pretty shooting star	
Draba kananaskis	Tundra whitlow-grass	
Glyceria leptostachya	Davy mannagrass	known
Hymenophyllum wrightii	Wright filmy fern	suspected
Isoetes truncata	Truncate quillwort	suspected
Ligusticum calderi	Calder lovage	suspected
Papaver alboroseum	Pale poppy	
Platanthera gracilis	Bog orchid	suspected
Poa laxiflora	Loose-flowered bluegrass	suspected
Puccinellia glabra	Smooth alkali grass	
Puccinellia kamtschatica	Kamchatka alkali grass	
Romanzoffia unalaschensis	Unalaska mist-maid	known
Senecio moresbiensis	Queen Charlotte butterweed	known
Stellaria ruscifolia ssp. aleutica	Circumpolar starwort	

Sources: U.S. Forest Service 1994, U.S. Forest Service 1997b, U.S. Forest Service 1999, U.S. Forest Service 2000

Eighteen species are listed as sensitive on the Tongass National Forest; of these, ten are known or suspected to occur on the Thorne Bay Ranger District. The habitat requirements and documented occurrences of these species are summarized below. Primary sources of information for this review include Region 10 Forest Service guides to rare and sensitive plants (USDA Forest Service 1991 and 1994, DeLapp 1992), Flora of Alaska (Hulten 1968), and Alaska Natural Heritage Program (AKNHP) plant guides and database search (Lipkin and Murray 1997, AKNHP 2001). Sensitive and rare plant surveys conducted within the last five years for the following projects were also reviewed: Coffman Cover Road Project Biological Assessment (USDA Forest Service 2000) and Luck Lake Timber Sales Biological Assessment and Biological Evaluation (USDA Forest Service 1999).

Goose-grass sedge (*Carex lenticularis var. dolia*) is known to occur in the coastal mountains of Alaska and British Columbia and in the northern Rocky Mountains. In Alaska, its distribution is limited to alpine areas within coastal southeast and southcentral Alaska and the Aleutian Islands. It has been recorded from several locations in Alaska, including Cleveland Peninsula on the Ketchikan Ranger District and from the Misty Fiords National Monument (USDA Forest Service 1994, AKNHP 2001).

Edible thistle (*Cirsium edule*) is native to coastal Oregon, Washington, British Columbia, and southernmost southeast Alaska. It is known from three locations in the Misty Fiords National Monument, where it is found in wet meadows and open woods along glacial streams (USDA Forest Service 1994, USDA Forest Service1997).

Davy mannagrass (*Glyceria leptostachya*) occurs in a spotty distribution from southeast Alaska to central California. It is known to occur in three locations in southeast Alaska: near Wrangell, at Swan Lake near Carroll Inlet on the Ketchikan Area, and near the Control Lake Junction on the Thorne Bay Ranger District (USDA Forest Service 1994, AKNHP 2001). The species grows in shallow freshwater along stream and lake margins. It is easily overlooked and is likely to be more widespread in southeast Alaska than suggested by these limited sightings.

Wright's filmy fern (*Hymenophyllum wrightii*) is a small moss-like fern known from coastal southeast Alaska and British Columbia to northern Japan, Korea, and the Soviet Far East. It has been reported historically at three locations in southeast Alaska, on Mitkof and Biorka islands (USDA Forest Service 1994). The species is found on humid shaded boulders, cliffs, tree trunks, and damp woods. In Alaska, Wright's filmy fern has been found on the bases of trees and rock outcrops in damp, humid woods.

Truncate quillwort (*Isoetes truncata*) is a shallow water aquatic species known from southcentral and southeast Alaska and Vancouver Island, British Columbia (USDA Forest Service 1994). It has been documented at North Saddle Lake near Carroll Inlet, Ketchikan Area (AKNHP 2001).

Calder lovage (*Ligusticum calderi*) occurs in the Queen Charlotte Islands and northern Vancouver Island. It has been reported in three locations in Alaska: Kodiak

Island, Dall Island, and southern Prince of Wales Island (Lipkin and Murray). The species occurs in Pleistocene refugia on wet to moist, often rocky sites, from 1,900 to 2,100 feet. In Alaska, the species is known from alpine meadow habitats and edges of subalpine mixed conifer forest.

Bog orchid (*Platanthera gracilis*) is limited to a small geographic range, with few documented occurrences, and is considered a questionably distinct taxon. Occurrences are known from southernmost southeast Alaska and adjacent British Columbia, including Dall Island, Pearse Canal, and Annette Island (USDA Forest Service 1994, AKNHP 2001). Bog orchid occurs in wet open meadow habitats.

Loose-flowered bluegrass (*Poa laxiflora*) occurs in a spotty distribution from Oregon and Washington to British Columbia and southeast Alaska. Seven sightings have been documented in southeast Alaska near Hoonah, Port Houghton, and Admiralty Island (USDA Forest Service 1994). The species is found in moist, open lowland woods and open-forested meadows.

Unalaska mist-maid (*Romanzoffia unalaschensis*) is endemic to the eastern Aleutian Islands, Alaska Peninsula, Kodiak Island, and scattered locations east to Sitka (USDA Forest Service 1994). One occurrence has been documented on the Thorne Bay Ranger District (USDA Forest Service 1997b). It is found in moist to wet habitats along river banks, beach terraces, and rock crevices. In Alaska, it has been found on wet rock outcrops and shorelines.

Queen Charlotte butterweed (*Senecio moresbiensis*) is limited to the Queen Charlotte Islands of British Columbia and disjunct populations in southeastern Alaska and northwestern Vancouver Island. Several occurrences have been documented in Alaska on southern Prince of Wales, Heceta, Coronation, and Dall islands (Lipkin and Murray 1997; USDA Forest Service 2000). Queen Charlotte butterweed occurs in alpine and subalpine areas with open, rocky, or boggy slopes, grassy talus slopes, or rocky heaths from 700 to 2,500 feet in elevation.

Queen Charlotte butterweed was documented at one location in the project area during 1999 plant surveys for the Coffman Cove Road Project (USDA Forest Service 2000). This species was observed along FDR 30 between Luck Lake and the Hatchery Y in the NW 1/4 of the NW 1/4 of Section 12, T69 S, R 82 E (Appendix A). This segment of FDR 30 was not selected for improvement in the Coffman Cove Record of Decision, but is now under consideration for improvement in the Sandy Beach Road Improvement NEPA analysis.

Table 2 summarizes the sensitive plant species known or potentially occurring within the vicinity of the project and their preferred habitats. Appendix B provides a listing of rare plant habitat associations for the Ketchikan Area.

Table 2. Sensitive Plant Species Known or Potentially Occurring in Project Area

Scientific Name / **Common Name**	**Likelihood of Occurrence in Project Area**	**Habitats**
Carex lenticularis var. dolia Goose-grass sedge	Unlikely	Alpine wet meadows, snowfield and glacier edges
Cirsium edule Edible thistle	Unlikely	Wet meadows and open woods along glacial streams; shallow freshwater, streams and lake margins
Glyceria leptostachya Davy mannagrass	May occur; known from Control Lake	Wet lowlands, shallow freshwater, stream and lake margins
Hymenophyllum wrightii Wright's filmy fern	May occur	Tree bases, rock outcrops with mosses in damp sites
Isoetes truncata Truncate quillwort	May occur	Shallow freshwater of lakes and streams
Ligusticum calderi Calder lovage	May occur; known from Prince of Wales	Subalpine and alpine meadows, rocky or boggy slopes, forest edge, typically on limestone
Platanthera gracilis Bog orchid	May occur; known from Dall Island	Wet open meadows
Poa laxiflora Loose-flowered bluegrass	May occur	Moist open lowland forests, open-forest meadows; also upper beach meadows
Romanzoffia unalaschensis Unalaska mist-maid	May occur; known from TBRD	Moist river banks and rock outcrops, beach terraces
Senecio moresbiensis Queen Charlotte butterweed	Documented in Project Area; FDR 30 near Luck Lake	Montane to alpine wet areas, rocky heath, bogs, meadows

Sources: AKNHP 2001
Hulten 1968
Lipkin and Murray 1997
USDA Forest Service 1994
USDA Forest Service 1997b
USDA Forest Service 199x
USDA Forest Service 2000

Other Plant Species of Concern

The U.S. Fish and Wildlife Service lists three Species of Concern with potential to occur in southeast Alaska. These are species for which the USFWS does not have sufficient information to support a listing proposal at this time. The Forest Service records occurrence information for these species in order to assist the U.S. Fish and Wildlife Service in tracking them.

Ascending moonwort fern (*Botrychium ascendens*) occurs in widely scattered populations in British Columbia, Ontario, Yukon, Alaska, California, Montana, Nevada, Oregon, and Wyoming (FNAEC 1993), with only two reported occurrences in Alaska (Lipkin and Murray 1997). It is found in grassy meadows between 0 and 8,000 feet elevation. Potential habitat is present in the project area, but the species has not been documented to be present.

Super round wedge moonwort fern (*Botrychium*, unnamed) is a taxon of uncertain validity. Little is known about its distribution, taxonomy, or habitat requirements. It is unknown whether potential habitat or populations of this fern occur in the project area.

Smooth-fruited net-leaf willow (*Salix reticulata* ssp. *glabellicarpa*) is known only from the Queen Charlotte Islands and a single occurrence on an alpine peak near Juneau (Argus 1965). It is a low-growing shrub of alpine tundra, wet depressions, alder thickets, mossy ravines, cliffs and ledges from 2,000 to 3,000 feet elevation (Lipkin and Murray). No alpine habitat occurs in the project area; therefore, this species is not expected to occur.

The Forest Service also tracks the occurrence of plant species considered to be rare in Alaska (DeLapp 1992). These species are not required to be included in a biological evaluation, but may need protection. If documented in a project area, and likely to be adversely affected, consultation with the Forest Botanist is recommended. A list of rare species that may occur in the Ketchikan Area is presented in Appendix C (USDA Forest Service 1997b).

Rattlesnake fern (*Botrychium virginianum* ssp. *europaeum*) was observed near the project area during 1999 plant surveys for the Coffman Cove Road Project (USDA Forest Service 2000). A small population of the fern was documented south of FDR 23. This species if found in upper beach meadows, open woods and meadows, typically on calcareous soils (USDA Forest Service 1991, Hulten 1963). Potential habitat for rattlesnake fern occurs in the project area.

Proposed Action and Survey Needs

Each of the action alternatives proposed for the Sandy Beach Road Improvement Project will result in ground disturbance along segments of existing roads. Alternatives 2 through 5 incorporate improvements ranging from additional turnouts to widening segments of road to two lanes. Alternative 5 includes construction of 6.0 miles of new road in a currently unroaded area.

Two of the ten sensitive species potentially occurring in the project area are known primarily from alpine areas. The proposed road improvements do not extend into alpine areas and are unlikely to affect *Carex lenticularis* var. *dolia* (goose-grass sedge) or *Cirsium edule* (edible thistle).

One sensitive species, Queen Charlotte butterweed, is known to occur in the project area and would be affected by implementation of Alternative 2. Road construction would affect individual plants, but is not likely to affect the population viability of *Senecio moresbiensis* on Prince of Wales Island.

Seven other sensitive species may occur in the project area, based on existing information on distribution and habitat associations. These species are associated with a variety of forested, open forest, meadow, and freshwater habitats. Calder lovage is typically associated with limestone which is present in the project area north of Luck Lake and near Baird Peak.

Areas proposed for ground disturbance should be surveyed for sensitive and rare plants prior to commencement of construction activities. A level 5, intuitive controlled survey (USDA Forest Service 1997a, TLMP Standards and Guides pg. 4-90) is recommended.

Forest Development Road 30 between Luck Lake and the Hatchery Y was surveyed in 1999 as part of the Coffman Cove Road Project. No additional surveys are needed along this segment of road.

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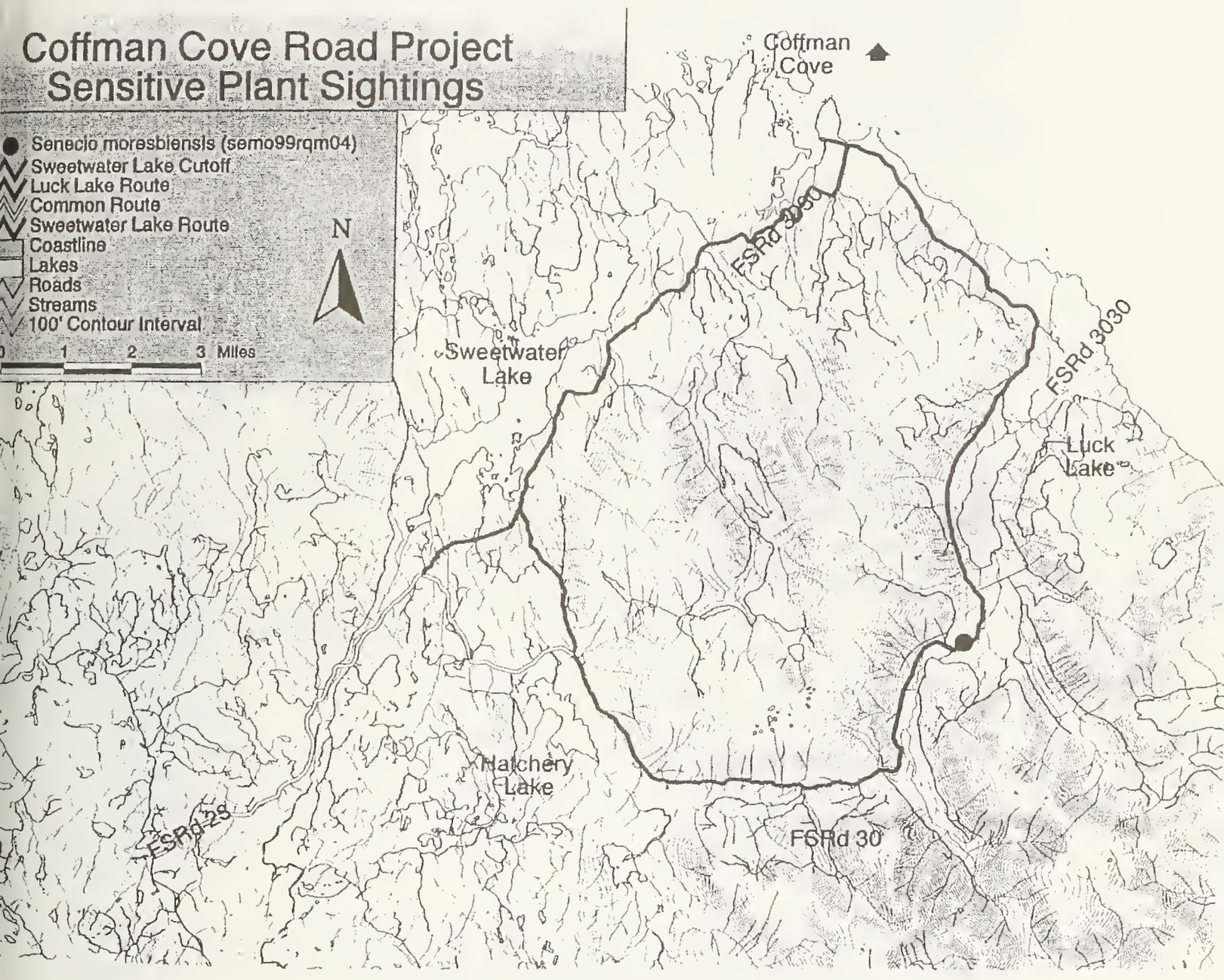
Appendix A

Mapped Locations of Documented Sensitive and Rare Plants in the Sandy Beach Road Improvement Project Area

(from USDA Forest Service 2000)


Coffman Cove Road Project
Sensitive Plant Sightings
Senecio moresbiensis (semo99rqm04)
Sweetwater Lake Cutoff
Luck Lake Route
Common Route
Sweetwater Lake Route
Coastline
Lakes
Roads
Streams
100' Contour Interval
N
0 1 2 3 Miles
Coffman Cove
FSRd 3030
FSRd 3030
Sweetwater Lake
Luck Lake
Hatchery Lake
FSRd 28
FSRd 30

Appendix B

Habitat Associations for Ketchikan Area Sensitive and Rare Plants

(from USDA Forest Service 1997b)

The following is a general grouping of sensitive and rare plants by habitat, as a general guide to seeking "potential habitats" during prefield review. Due to their rarity and lack of detailed study, little is known about the habitat requirements of rare plants in Alaska. It is also important to note that these habitats do not always have discrete boundaries. There is a great deal of overlap and gradation between habitat types, for example the bank of a small stream overlaps old growth forest when it flows through a forested area. Thus many species are listed under more than one habitat type. This information may be useful as a preliminary guide in developing a survey plan for a site.

Oldgrowth Conifer Forests (mostly the more productive forests; mixed conifer and edge type forests are listed sepparately):

Sensitive	**Rare**
Glyceria leptostachya	*Campanula scouleri*
Hymenophyllum wrightii	*Danthonia spicata*
Poa laxiflora	*Listera convallarioides*
	Mitella trifida
	Monotropa uniflora
	Platanthera orbiculata
	Platanthera unalschcensis
	Stachys emersonii

Streams (in channel or on banks):

Sensitive	**Rare**
Circium edule	*Brasenia schreberi*
Glyceria leptostachya	*Crataegus douglasii var. douglasii*
Isoetes truncata	*Mimulus lewisii*
Platanthera chorisiana	*Taxus brevifolia*
Poa laxiflora	*Trifolium wormskjoldii*
Romanzoffia unalaschensis	

Forb Dominated Forested Wetlands (this is a rare type dominated by *Lysichiton americanum*, large *Athyrium felix-femina, Oplopanax horridus, Viola glabella, Tiarella trifoliata, Circaea alpina, Pelia neesiana, Rhizomnium glabrescens*, and *Conocephalum conicum*):

The rare plant *Listera convallarioides* is strongly associated with this unusual, high-nutrient plant community type in the Ketchikan Area. It has been found in and near units, and should be protected. First sightings for the Alaska Region National Forests was in 1997 in the Ketchikan Ranger District.

Mixed Conifer Forests and Forest-edge Transitional Habitats:

Sensitive	Rare
Ligusticum calderi	*Betula payrifera var. commutata*
Platanthera chorisiana	*Crataegus douglasii var. douglasii*
Poa laxiflora	*Lathyrus ochroleucus*
Senecio moresbiensis	*Penstemon serrulatus*
	Platanthera orbiculata
	Stachys emersonii
	Taxus brevifolia

Cliffs and Rock Outcrops (occur sporadically in units)**:**

Sensitive	Rare
Hymenophyllum wrightii	*Campanula scouleri*
Ligusticum calderi	*Isopyrum salvilei*
Romanzoffia unalaschensis	

Bogs - Dominated by *Sphagnum* and Short sedges:

Sensitive	Rare
Ligusticum calderi	
Platanthera chorisiana	
Romanzoffia unalaschensis	
Senecio moresbiensis	

Fens - Dominated by Tall Sedges and Water Table at the Surface:

Sensitive	Rare
Glyceria leptostachya	*Calamagrostis crassiglumis*
Platanthera chorisiana	
Senecio moresbiensis	

Wet Meadows - Plants Reported to Occur in Wet Meadows of Non-Specific Description:

Sensitive	Rare
Carex lenticularis var. dolia	*Botrychium virginianum ssp. europaeum*
Circium edule	*Juncus articulatus*
Platanthera gracilis	*Lathyrus ochroleucus*
Poa laxiflora	*Mitella trifida*
Ranunculus orthorhynchus var. alaschensis	*Penstemon serrulatus*
	Platanthera unalaschcensis
	Saussurea americana
	Stachys emersonii
	Trifolium wormskjoldii

Lakes and Ponds (immersed or in the margins):

Sensitive	Rare
Glyceria leptostachya	*Brasenia schreberi*
Isoetes truncata	*Calamagrostis crassiglumis*
Platanthera chorisiana	*Juncus articulatus*
	Scirpus subterminalis

Maritime Beaches, Upper Beach Meadows, Shorline:

Sensitive	Rare
Poa laxiflora	*Botrychium virginianum ssp. europaeum*
Ranunculus orthorhynchus var. alaschensis	*Calamagrostis crassiglumis*
	Castilleja chrymactis
	Lathyrus ochroleucus
	Trifolium wormskjoldii

Major River Valley Bottoms:

Sensitive	Rare
	Betula papyrifera var. commutata

Alpine and Subalpine Habitats:

Sensitive	Rare
Carex lenticularis var. dolia	*Isopyrum salvilei*
Ligusticum calderi	*Mimulus lewisii*
Poa laxiflora	*Mitella trifida*
Senecio moresbiensis	*Saussurea americana*
Salix reticulata ssp. glabellicarpa	

Glacial Outwash/Morrainal Areas:

Sensitive	Rare
Carex lenticularis var. dolia	

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Appendix C

Rare Plants of the Ketchikan Area

(from USDA Forest Service 1997b)

Scientific Name	Comon Name	Global Rank	State Rank
Betula papyrifera var. commutata	Western paper birch	G5T5	S2
Botrychium virginianum ssp. europaeum	Rattlesnake fern	G5T5	S1S2
Brasenia schreberi	Water shield	G5	S1
Calamagrostis crassiglumis	Thickglume reedgrass	G3	S1
Campanula scouleri	Scouler hairbell	G5	S1
Castilleja chrymactis	[a paintbrush]	G1Q	S1
Crataegus douglasii var. douglasii	Black hawthorn	G4T4	S1S2
Danthonia spicata	Common wild oatgrass	G5	S1
Isopyrum salvilei	Salvile's isopyrum		
Juncus articulatus	Jointed rush	G5	S1
Lathyrus ochroleucus	Cream-flowered peavine	G4G5	S1
Listera convallarioides	Broad-lipped twayblade orchid	G5	S1
Lupinus lepidus	Prairie lupine	G5	S1
Mimulus lewisii	Purple monkey flower	G5	S1
Mitella trifida	Three-toothed mitrewort	G5	S2
Monotropa uniflora	Indian pipe	G5	S1S2
Penstemon serrulatus	Beardtongue	G4	S1
Platanthera orbiculata	Round-leaved bog orchid	G5	S1
Platanthera unalaschcensis	Alaska bog orchid		
Polystichum kruckebergii	[a sword fern]		
Saussurea americana	American sawwort	G5	S2
Scirpus cernuus	[a sedge]		
Scirpus subterminalis	Swaying rush	G4G5	S1
Stachys emersonii	Ciliate hedge nettle		
Taxus brivifolia	Pacific yew	G4	S2
Trifolium wormskjoldii	Coast clover	G5	S1

ALASKA NATURAL HERITAGE PROGRAM RARE SPECIES RANKINGS

Global Rankings:

G1: Critically imperiled globally
G2: Imperiled globally

G3: Either very rare and local throughout its range or found locally in a restricted range
G4: Apparently secure globally
G5 Demonstrably secure globally
GH: Species based on historical collections, possibly extinct
G#Q#: Taxonomically questionable
G#T#: Global rank of species and global rank of the described variety or subspecies of the species
G#G#: Global rank of species uncertain, best described as a range between the two ranks

State Rankings:

S1: Critically imperiled in state because of extreme rarity or some factor(s) making it especially vulnerable to extirpation from the state.
S2: Imperiled in state because of rarity or because of some factor(s) making it very vulnerable to extirpation from the state
S3: Rare or uncommon in the state
S4: Apparently secure in state, with many occurrences
S5: Demonstrably secure in state, with many occurrences
SH: Species based on historical collections, possibly extinct
SR#: Reported from the state, but not yet verified
SP: Occurring in a nearby state or province; not yet reported in state, but probably will be encountered with further inventory
S#S#: State rank uncertain, best described as a range between the two rank

Appendix C

Integrated Weed Management Plan

Sandy Beach Road (FDR 30) Improvement Project
Draft
Integrated Weed Management Plan

Prepared for:

Harza Engineering

and

Thorne Bay Ranger District
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1. Introduction

The Forest Service proposes to improve road conditions along Forest Development Road (FDR) 30 between Thorne Bay and Coffman Cove on Prince of Wales Island, Alaska. A variety of road widening and surfacing proposals for eight different road segments are being evaluated through the NEPA process. Each of the proposed alternatives, including the no action alternative, has the potential to affect the distribution of weedy invasive plants, including state-listed noxious weeds, through construction and other human activities. This draft Integrated Weed Management Plan has been developed to provide direction for the identification and management of weed species in the project area.

2. Regulatory Authority and Definitions

Authority and responsibility for managing weeds is provided by both federal and state legislation (see Appendix A for a list of laws, regulations, and policies regarding weed management). The major authorities for management of non-native plants are described briefly below.

The Plant Protection Act (Title IV of the Agricultural Risk Protection Act of 2000) addresses the need to detect, control, eradicate, prevent, and otherwise manage plant pests and noxious weeds in order to protect agriculture, the environment, and the economy of the United States. The Plant Protection Act replaces the Federal Noxious Weed Act (FNWA); the Amendment to the FNWA which defines 'undesirable plants' such that it includes, but is not limited to, noxious weeds remains in effect. Under the Amendment, each federal agency must designate an office or person to develop and coordinate an undesirable plants management program for federal lands under the agency's jurisdiction.

Executive Order 13112 (1999) directs federal agencies whose actions may affect the status of invasive species to manage these species through prevention, detection and response, monitoring, restoration, research, and public education. An Invasive Species Council was established per the Order; this inter-agency executive committee will coordinate efforts to minimize the economic, ecological, and human impacts of invasive plant and animal species in the United States. A national Invasive Species Management Plan was established by the Council in January 2001. This plan defines the Forest Service's authority to include prevention of the spread of invasive species onto national forest system lands, assisting other landowners in preventing the spread of invasive species onto non-federal lands, and providing research and development support to the U.S. Department of Agriculture.

The Plant Protection Act defines noxious weeds as '...any plant or plant product that can directly or indirectly injure or cause damage to crops (including nursery stock or plant products), livestock, poultry, or other interests of agriculture, irrigation, navigation, the natural resources of the United States, the public health, or the environment.' Executive Order 13112 defines alien species as '...any species, including its seeds, eggs,

spores, or other biological material capable of propagating that species, that is not native to that ecosystem.'

Title 3 of the Alaska State Statutes provides authority to the Department of Natural Resources, Division of Agriculture for control of noxious weeds. Regulations relating to noxious weed control are included in Title 11 Chapter 34 of the Alaska Administrative Code.

The state of Alaska defines noxious weeds as plants that 'may become destructive and difficult to control…' In Alaska, fourteen species are currently listed as noxious weeds:

- Austrian fieldcress (*Rorippa austriaca*)
- Blue lettuce (*Lactuca tatarica* ssp. *pulchella*)
- Canada thistle (*Cirsium arvense*)
- Field bindweed (*Convolvulus arvensis*)
- Hempnettle (*Galeopsis tetrahit*)
- Horsenettle (*Solanum carolinense*)
- Leafy spurge (*Euphorbia esula*)
- Perennial sowthistle (*Sonchus arvensis*)
- Quackgrass (*Elytrigia [Agropyron] repens*)
- Russian knapweed (*Acroptilon [Centaurea] repens*)
- Smallflower galinsoga (*Galinsoga parviflora*)
- Whitetop and its varieties: (*Cardaria draba, C. pubescens, Lepidium latifolium*)

3. Statement of Weed Problem

Invasive non-native plants have been introduced to Alaska through seed and plant materials. Once established, these species spread through natural dispersal, by land use practices, and through human recreation activities. While not all non-natives are undesirable, those that are weedy and invasive can create serious economic effects for land managers and can have ecological effects on native plant communities and ecosystems. Most introduced species have no natural controls, and in suitable habitats, reproduce extensively resulting in dense stands that may crowd out native species and modify soil and hydrologic conditions. Many weed infestations can be slowed, halted, or reversed. In some situations, badly infested areas can be restored to healthy systems dominated by native plants; in others, control of the spread of the species is the only reasonably attainable goal.

A recent report on non-native plant species of Prince of Wales Island (Belfield 1997) lists 60 non-native species occurring on the island. A review of rare plant survey and weed plan documents for the State Highway 929 Project (Brucker 2000a and 2000b) and a Ketchikan Area weed survey (USDA Forest Service 1997) indicates an additional ten non-native species in the general project vicinity. Appendix B provides a list of non-native species documented in the project area and on Prince of Wales Island.

4. Review of Existing Information

The objective of the Integrated Weed Management Plan for the Sandy Beach Road Improvement Project is to identify and prevent the spread of undesirable weed species within the project area and to prevent the introduction of other weed species. Goals of the plan include:

- **Identify those non-native plant species that have the potential to threaten the resource and human use management objectives of the project area.** These are the target weed species. The list will automatically include federal and state-listed noxious weeds. Other non-native species may be added to the list based on their impacts, e.g. ability to outcompete valuable native plant communities, production of chemicals toxic to animals or humans, effects to soil conditions, and/or ability to cause allergies. Identification of target weed species often involves input from the public, affected landowners, and resource management agencies.

- **Inventory and map target weed species in the project area.** Most non-native plants species in the project area occur within a few hundred feet of the road. Thus, the area of analysis for this project will be a narrow, linear corridor encompassing the existing road and areas to be affected by realignment, widening, and new road construction.

- **Determine available methods to manage the weed species in the project area.** Existing literature review will provide the range of treatment methods available for each species and for weeds in general; not all of these may be appropriate for implementation in the project area.

- **Develop and implement an integrated treatment strategy for the target weed species in the project area.** This plan will include measures to control the spread of weeds within the project area under the proposed road improvement activities and during normal use and maintenance of the road. It will also identify measures to prevent introduction of weeds to the project area from areas outside the project boundaries.

- **Monitor the effectiveness and implementation of the weed management actions.** Monitoring allows evaluation of the success of the weed management measures and provides information necessary for regular updating and modification of the weed plan.

This section presents a summary of existing information on non-native species present in and near the project area. A preliminary list of target weed species is provided, based on existing occurrence data and the tendency of a species to invade and outcompete native plants. Available treatment methods for target weed species are described. Methods for reducing the introduction and spread of weeds in the project area are presented.

4.1 Target Weed Species

Three species listed as noxious weeds by the state of Alaska have been documented on Prince of Wales Island: Canada thistle (*Cirsium arvense*), common hemp nettle (*Galeopsis tetrahit*), and quackgrass (*Elytrigia repens*). Canada thistle has been observed along the State Highway 929 road system a few miles west of Thorne Bay (Brucker 2000). The other two species have been observed near Black Bear Creek (quackgrass) and the City of Craig (common hemp nettle), over twenty miles from the Sandy Beach Road project area (Belfield 1997). Canada thistle is selected as a target weed species due to its proximity to the project area.

Two non-native plant species that are aggressive invaders of upland sites have been documented in the Sandy Beach project area: Scot's broom (*Cytisus scoparius*) and tansy ragwort (*Senecio jacobaea*) (Belfield 1997, USDA Forest Service 1997). Bull thistle (*Cirsium vulare*), also an invasive upland weed, has been documented along State Highway 929 west of Thorne Bay (Brucker 2000b). Reed canarygrass (*Phalaris arundinacea*) is an invader of wetland habitats and is present in at least one extensive stand in the project area (Belfield 1997). These species are selected as target weed species due to their tendency to invade native plant communities and form extensive stands.

Two other species, commonly introduced in roadside seeding mixes, have been observed encroaching on natural wetlands in the Thorne Bay area. These species, orange hawkweed (*Hieracium aurantiacum*) and ox-eye daisy (*Chrysanthemum leucanthemum*) have been recommended for monitoring to determine their capability for invading native wetlands (Belfield 1997). These two species are proposed for inclusion in inventory and monitoring efforts, but are not selected as target species for control methods at this time.

Three invasive species known from elsewhere on Prince of Wales Island may occur within the Sandy Beach project area. These species are tumble mustard (*Sisymbrium officinale*) and St. Johnswort (*Hypericum perforatum*), both observed in the Craig area, and Japanese knotweed (*Polygonum cuspidatum*) (Belfield 1997). If determined to be present in the Sandy Beach project area, these three species should be added to the list of target weed species.

Other non-native species known to occur in the project area include the following: foxglove (*Digitalis purpurea*), colonial bentgrass (*Agrostis capillaris*), cheatgrass (*Bromus tectorum*), chickweed (*Cerastium sp.),* perennial ryegrass (*Lolium perenne*), common plantain (*Plantago major*), and annual bluegrass (*Poa annua*). These species have been introduced intentionally and unintentionally through seed mixes. Although non-native, they do not generally spread invasively into native plant communities. For this reason, they are not included on the list of target weed species.

Five species are proposed for the preliminary list of target weed species: Canada thistle, tansy ragwort, bull thistle, reed canarygrass, and Scot's broom. The target weed

species list should be reviewed annually upon completion of monitoring, and updated as necessary to add or delete species from the list.

4.2 Known Weed Sites

Canada thistle is a state-listed noxious weed known to occur along State Highway 929 a few miles west of the city of Thorne Bay (power pole # 239, Brucker 2000b). This species may occur in the project area.

Bull thistle is present along State Highway 929 west of Thorne Bay (power pole #282, Brucker 2000b), and may occur in the project area.

Tansy ragwort has been observed in a rock pit near Sandy Beach (Belfield 1997) and in Thorne Bay (Brucker 2000b).

Reed canarygrass was formerly a component of erosion control seed mixes and is common in roadside ditches on Prince of Wales Island. An extensive stand of reed canarygrass is present in a beaver pond complex along FDR 30 near Luck Creek (Belfield 1997); it is also present at Sandy Beach (USDA Forest Service 1997).

Scot's broom has been documented in the project area near Luck Lake (Belfield 1997).

4.3 Available Management Methods

4.3.1 Prevention

The management strategy with the lowest cost and least environmental impact is prevention. Methods to prevent weed introduction into an area include best management practices during construction and education.

Educate the public and agency personnel about the need for weed management. Educating agency personnel as well as the public is an important step in an integrated approach to weed prevention and control. The greater the level of understanding of weed issues, the more support there will be for weed control efforts.

Prevent introduction via recreation use. Unintentional dispersal of weeds by recreationists can be reduced by educating the public as to which weeds are easily transported by vehicles, tires, and camping equipment. Provide information to campers that includes weed identification tips, areas of concern, and recommendations for removing weed seed.

Backcountry habitats may be at risk of weed introduction through use of pack animals. Inform backcountry users of the risks of weed transport, and recommend measures to reduce the likelihood of transport.

High use recreation areas can be prioritized for weed control activity, to reduce the infestation levels and opportunities for transport.

Prevent introduction during ground-disturbing construction, reconstruction, and maintenance projects. Weeds, as a group, tend to be colonizing species, quick to germinate on disturbed soil. Proper management of disturbed soil is the most critical element in reducing the introduction and spread of weeds. Weed management should be incorporated into every project from the planning and design phases. Best management practices to prevent the introduction and spread of weeds in the areas affected by ground disturbance should be specified and implemented. Engineers and construction staff should be educated about the need for weed management and the modes of transportation of weed seed. Revegetation of disturbed sites is essential in preventing weed infestations, and timely implementation of reseeding activities should be a high priority. When working with cooperating agencies and landowners, identify weed management issues, concerns, and efficiencies that can be achieved.

4.3.2 Physical Control (manual cutting, hoeing, pulling)

Canada thistle: Hand cutting or hoeing is practical only in very small or sensitive areas. For effective control, these treatments must be started when the root reserves are low in the spring and repeated every three to four weeks until the plants stop putting up new sprouts. Followup treatment is needed for several years until the seed bed is depleted.

Bull thistle: Hand cutting or grubbing is practical in small infestations. This method can be done at anytime during the life cycle, as bull thistle is taprooted and reproduces only by seed. Followup treatment is needed for several years until the seed bed is depleted.

Tansy ragwort: Hand pulling is only effective where there are a few plants in their first year of growth. In new infestations that are less than 0.1 acre, hand pulling can be 50 percent effective. In areas where ragwort has become well-established, followup treatment will be necessary, as pulling can cause soil disturbance and allow seed germination. Pull plants when soils are moist to facilitate complete removal of the root mass.

Reed canarygrass: Hand-pulling or hoeing is effective only in extremely small, recent infestations. Care must be taken to remove the entire root system.

Scot's broom: Young plants can be hand-pulled. Removal of entire taproot is necessary to prevent resprouting, and can be labor-intensive for mature plants. Followup treatment is necessary for several years after pulling mature plants, as the seed bed will continue to germinate.

4.3.3 Mechanical Control (mowing, weed whacking, and cultivation)

Canada thistle: Mowing, weed whacking, and cultivation can be used to control Canada thistle. These treatments prevent seed formation and eventually deplete the thistle root reserves so that it can no longer send up shoots. Although the literature contains a great deal of sometimes conflicting information, most sources are in agreement that these methods cannot control Canada thistle in one season, and that timing and frequency of the treatments has considerable effect on their effectiveness.

Hodgson (1968a and 1968b) reports that the thistle root reserves are lowest 4 to 6 weeks after the first plants emerge in the spring. When the plants are cultivated, new shoots emerge in about 10 days. Ten to 15 days after they sprout, these shoots are capable of furnishing food to the roots once again. This information led him to recommend cultivating 3 or 4 inches deep with overlapping sweeps of a duckfoot cultivator every 3 weeks throughout the growing season. He noted that when the weather is hot and dry, the shoots sprout more slowly and the interval between cultivations can be lengthened to 4 weeks.

Like cultivation, mowing and weed whacking will be most effective when used to destroy newly emerged shoots before they are capable of replenishing the root reserves. The recommendations for frequency and timing of mowing are less precise than for cultivation, and not as well documented. Generally, mowing or weed whacking should be initiated when root reserves are at their lowest (4 to 6 weeks after emergence) and should be repeated every 3 to 4 weeks to deplete the root reserves. Because mowing stimulates thistle roots to produce more shoots, incomplete treatment could result in an increased density of thistles (Haderlie et al. 1991).

Bull thistle: Mechanical control of bull thistle can be attained through mowing or weed whacking shortly before flowering and then removing stems (CDFA 2001). If mowing is done early in the season the plants may resprout, and will need to be cut a second time. Because the species is a biennial or short-lived perennial, mowing or weed whacking over a few seasons will result in removal of existing plants and reduction of seed source. It should be noted that immature flower heads, when cut, may still develop viable seed (CDFA 2001). Removal of the cut material is essential for success of this method.

Tansy ragwort: Mechanical control of established stands of tansy ragwort is difficult. Mowing or weed whacking removes the upper parts of the plants and can prevent tansy ragwort from going to seed. However, vegetative reproduction is stimulated by mowing, grazing, or incomplete removal of the rootstock, resulting in multi-stemmed plants (CDFA 2001, Coombs et al. 1997).

Cultivation of established stands of tansy ragwort is effective with heavy, repeated cultivation which prevents the growth of seedling and root sprouts. Light cultivation stimulates regrowth of the roots.

Reed canarygrass: Mechanical control of reed canarygrass is practical only in situations where thorough treatment of the site can be repeated many times each year over a period of several years (Naglich 1994). Reed canarygrass should be field disked or plowed just before the plants come into flower, when available carbohydrate reserves in the rhizome system are low.

Mowing or weed whacking reed canarygrass to less than 4 inches height removes the growing portion of the stem during early season growth. Repeated, closely timed removal of the growing shoots will stress the plants, and will eventually result in reduced growth and flowering and thinning of the stands (Antieau 1998). Thinning of the stands may allow germination and establishment of other plant species, when sufficient seed source is present. Mowing or weed whacking should be performed early in the season and repeated frequently. Incomplete treatment will allow recolonization of the site.

Scot's broom: Because of the woody nature of mature Scot's broom plants, mechanical control requires heavy mowing or cultivating equipment. Cutting removes the above-ground portion of the plants, but leaves the root crown, which will resprout. Resprouting is reduced when cutting is performed at the end of the dry season (CDFA 2001). Caution must be used in handling the cut plant material and equipment, as seed can be dispersed to new sites.

4.3.4 Burning

Flame weeders burn liquid propane to create temperatures high enough to kill exposed plant parts, insects, and, if hot enough, weed seeds. Burned plants do not immediately collapse and may appear undamaged, but if flaming was effective, they will die within a few days. If gentle pressure on the leaf results in an immediate water-soaked appearance in the pinched area, the leaf has been damaged enough to collapse within a few days.

Flame weeding is practical for killing small patches of some weed species, including tansy ragwort. Flame weeding does not kill the roots of many established biennials and perennials, such as Canada thistle and Scot's broom, and is generally impractical for large infestations.

Prescribed burning can be used to treat large areas, but requires special training and equipment. Repeated burns may be necessary to stress and kill species that spread by rhizomes, such as reed canarygrass (Naglich 1994). Scot's broom and reed canarygrass will resprout vigorously after fire, and germination of Scot's broom seeds is stimulated by fire. Fire can be used to remove above-ground vegetation, but retreatment will be required. Some species with these characteristics can be controlled with repeated burns and others may be especially vulnerable to herbicides after a burn. In Illinois, reed canarygrass was controlled by a burning-herbicide combination treatment. Burning removed the surrounding thatch, and then glyphosate herbicide was applied (Tu et al. 2001).

4.3.5 Mulching and Shading

Mulching controls weeds by excluding light and by forming a physical barrier for plant growth. Tansy ragwort and reed canarygrass can be controlled with very deep mulch (12 inches or more) maintained over a period of several years (Brucker 2000b, Antieau 2001). Light must be completely eliminated and the mulch should extend 15 feet or more beyond the edge of the infested area to prevent roots and dispersed seeds from sprouting. Once the plants are killed, the area should be reseeded. Mulching has not been shown to be effective on thistle species or Scot's broom (Brucker 2000b, CDFA 2001).

Many weed species are susceptible to shading by surrounding vegetation. Scot's broom and bull thistle will eventually lose vigor and decline on sites where other vegetation is allowed to grow tall and provide heavy shade.

Species with creeping rhizomes or spreading roots, such as tansy ragwort, Canada thistle, and reed canarygrass, respond to shade by directing growth outward to more well-lit areas. Shading of established stands is generally not an effective method of control for these species.

4.3.6 Competitive Revegetation

Reestablishment of dense, competitive vegetation can help permanently replace weeds in areas where weedy vegetation has been removed. Crop competition can be an effective control for Canada thistle in agricultural settings (Coombs et al. 1997, Burrill et al. 1991). Alfalfa is particularly useful because it is a perennial crop, sprouting before Canada thistle in the spring and rapidly closing the canopy. It can also be mowed early and frequently, and it recovers from mowing faster than Canada thistle. Reseeding with crop species can also be effective for reducing survival of tansy ragwort seedlings after treatment to remove mature plants (CDFA 2001).

Revegetation is essential in preventing establishment of weeds on sites that are newly disturbed. Fast growing native, or approved non-native, seed mixes should be applied to disturbed sites. Followup fertilization and reseeding should be scheduled into the monitoring plan.

4.3.7 Chemical Control

In an integrated weed management plan, herbicides are considered transition tools that enable the manager to suppress weeds and replace them with desirable, competitive vegetation. It is important to select the least-toxic, low-residual herbicide that is effective against the target weed, and to apply it in a judicious manner. Using chemical control will often trigger an environmental analysis for a project.

Canada thistle: The broad spectrum, non-selective, systemic herbicide glyphosate (Roundup) is effective on Canada thistle. This herbicide will kill both

broadleaf plants and grasses, and will affect vegetation surrounding the target species. Herbicide is applied directly to Canada thistle when plants are actively growing, past bud growth stage, but before seeds are produced. After cultivation or mowing, basal rosettes of at least 6-inch diameter can be treated in late summer or fall to suppress following year's growth (Burrill et al. 1991). During this time, they will be actively growing and transporting nutrients to roots for winter storage and systemic herbicides can be more effectively transported along with these nutrients.

Bull thistle: Bull thistle is sensitive to the herbicide glyphosate (Burrill et al. 1991). The best time to treat biennial thistles with herbicides is in late fall or early spring when the rosettes are present but before flowering stalks are initiated (Brucker 2000b). Thistle rosettes need to be treated when they are actively growing and not under drought stress. The younger the rosette, the more susceptible it is to herbicide. One properly timed treatment per year should prevent seed formation. Fall treatments should be made late enough to kill all rosettes germinated before winter. Late germinating rosettes that establish after early fall herbicide applications could flower the next growing season. Early spring treatments should kill all overwintering rosettes and those rosettes germinating later (spring and summer) should not produce seed until the following year. Glyphosate will kill vegetation surrounding the target weed species.

Tansy ragwort: Tansy ragwort is resistant to glyphosate, but is sensitive to triclopyr, 2,4-D, picloram and dicamba (Burrill et al. 1991). Herbicides should be applied during early growth of the seedlings for the best results. Small, isolated patches of tansy ragwort may be controlled by spot treatment of herbicides.

Reed canarygrass: Glyphosate is effective against reed canarygrass (Burrill et al. 1991). Complete eradication of the weed is likely to take multiple treatments. A combination of burning or mowing followed by herbicide application has been effective in some sites.

Scot's broom: Glyphosate is effective against Scot's broom when applied directly to actively growing plants in the spring (Burrill et al. 1991). Seeds will continue to sprout for several years; subsequent retreatment or physical removal of seedlings is recommended. This herbicide will affect other plant species that are important in outcompeting and shading Scot's broom. For this reason, the herbicide should be spot applied with care to avoid neighboring vegetation.

4.3.8 Biological Control

Biological control involves using living organisms, such as insects, pathogens, or grazing animals, to suppress a weed infestation. This method does not aim to eradicate weeds, but to keep them at low, manageable levels. After their introduction, biocontrol agents can take 5 to 10 years to become established and increase to numbers large enough to reduce the density of the target weed. Biological control attempts to recreate a balance of plant species with their natural enemies. Use of biological control measures will trigger an environmental analysis.

Biological control methods for weed species have not been extensively tested in Alaska, and their effectiveness remains to be demonstrated. For this reason, they are not considered further for use in this integrated weed management plan. Biological control methods for several of the target weed species are presented in Brucker (2000b).

5. Integrated Weed Management Strategy

Integrated weed management is based on the principle that a combination of control strategies is often more effective than a single strategy. An integrated approach allows the selection of the best-suited preventative, physical, mechanical, chemical and biological controls for the site conditions. Strategies for the management of weeds must be compatible with the management objectives for the area. For the Sandy Beach Road Improvement Project, these objectives include natural resource management (including fish, wildlife, and timber), recreation and scenery values, and public transportation. The economic, environmental, and social costs of the weed control methods must be balanced against the legal requirement and benefits of weed control.

The Sandy Beach Road Improvement Project is located primarily on national forest system lands that are managed for natural resources and a variety of human uses. The nature of the project, and of weed distribution in the project area, is linear. The road, along with its rock pits, recreation areas, and managed timber stands, provide disturbed soil suitable for colonization by weedy species. Some of the weed species may have been introduced through erosion control seed mixes; others may have been carried to the sites unintentionally through vehicle and human use of the roadways. Even with treatment to control existing weed populations, the roadway will continue to provide a conduit for introduction of weed species from outside of the project area.

The integrated weed management plan described below incorporates the management objectives and characteristics of the project area, as well as current state and federal policy and direction.

5.1 Target Weed Species and Weed Sites

Five species are proposed as target weed species for the Sandy Beach Road Improvement Project. Three of these species are known to occur within the project area, and two have been documented in the vicinity. Five additional species are proposed for monitoring, to document their occurrence and determine whether they are actively invading high value native habitats. Table 1 presents the target weed species, other species of concern, and the weed sites documented to date.

Table 1. Target Weed Species and Known Weed Sites

Target Weed Species	**Known in Project Area**	**Location and Source**
Canada thistle *Cirsium arvense*	no	West of Thorne Bay at power pole 239 on State Highway 929 (Brucker 2000b)
Bull thistle *Cirsium vulgare*	no	West of Thorne Bay at power pole #282 on State Highway 929 (Brucker 2000b)
Tansy ragwort *Senecio jacobaea*	no / yes	Thorne Bay (Brucker 2000b); Rock pit near Sandy Beach (Belfield 1997)
Reed canarygrass *Phalaris arundinacea*	yes	Sandy Beach (USDA Forest Service 1997) FDR 30 near Luck Creek (Belfield)
Scot's broom *Cytisus scoparius*	yes	Near Luck Lake (Belfield 1997)
Other Weeds of Concern		
Orange hawkweed *Hieracium auranticum*	no	Thorne Bay (Belfield 1997)
Ox-eye daisy *Chrysanthemum leucanthemum*	no	Thorne Bay (Belfield 1997)
St. Johnswort *Hypericum perforatum*	no	Craig (Belfield 1997)
Tumble mustard *Sisymbrium officinale*	no	Craig (Belfield 1997)
Japanese knotweed *Polygonum cuspidatum*	no	Unknown location, Prince of Wales Island (Belfield 1997)

5.2 Inventory

Field inventory to be conducted in summer 2001 will provide additional site specific information on weed species in the project area, including number, size, and location of weed infested sites. The survey will include the road corridor and other disturbed soil areas along all road segments analyzed in the Sandy Beach Road Improvement Environmental Assessment. Field review will not be necessary for road segment 8, proposed new construction between Ratz Harbor and Eagle Creek, as target weed species are not likely to be present in this unroaded area.

A crew of two biologists, trained in the identification of weedy and native plants, will drive the road corridor and walk through each site infested with target weed species, including rock pits, recreation areas, and other disturbed areas. The crew will number each weed site and record the following information:

- target weed species present;
- location of site, record on 1 inch:1 mile scale (or greater) map and GPS, if available; use separate maps for different species if multiple species present;
- description of the site, including

- area of infestation of each weed species:
  spot < 10 square feet
  small =10 square feet to 0.1 acre
  moderate > 0.1 acre to 0.5 acre
  large > 0.5 acre to 2 acres
  extensive > 2 acres
- infestation level:
  low = occasional plant, less than 5 % cover
  moderate = widely scattered plants, 5-25 % cover
  high = relatively dense, >25% cover
- description of human activity at the site (maintained ditches, culverts, informal camping, formal recreation activities, etc.);
- list other native and non-native species observed within infested area and estimate percent cover of dominants.

5.3 Treatment Threshold, Site Prioritization and Level of Control

Treatment threshold is the size or area of weed infestation that will trigger management action. For this project, a treatment threshold of 'spot' size infestation (<10 square feet) is recommended. All spot size infestations of any target weed species should be recorded and treated with the goal of complete eradication. This very small threshold size is appropriate for the project area because the level of infestation by weeds is relatively low, and eradication of new infestations is reasonable to achieve.

Infestations in the small, moderate, large and extensive size categories should all be mapped, monitored, and considered for treatment. Recommendations for control levels and treatment methods are presented below for each species.

The weed plan manager will prioritize weed treatment for the inventoried sites. The highest priority sites should be those that have the greatest potential for eradication or reduction of weeds at the most economical cost. Those sites most at risk due to the effects of weed infestation should also be recommend for prioritized treatment. A recommended prioritization is as follows, beginning with the highest priority:

- spot and small, recently infested sites,
- moderate-sized infestations,
- large infestations,
- extensive infestations

Within each size category, sites meeting any of the following criteria would increase the priority for treatment:

- sites being those actively used by recreationists,
- rock pits proposed for use in the road reconstruction project,
- sensitive and rare species habitats.

The weed plan manager will establish a desired level of control for each weed site based on the results of the initial weed inventory. The level of control will reflect the size

and density of infestation, the relative difficulty of managing the species, availability of funding and control technology, and special site considerations such as sensitive habitats or species, land use, and potential for reintroduction. Levels of control, along with treatment priority and treatment methods, may be modified in subsequent years based on the results of monitoring and evaluation.

Containment is defined as keeping an established population of a weed from spreading to non-infested areas. This strategy is often appropriate for large infestations, very dense infestations, and difficult to eradicate species. It is often the most cost-effective approach for such situations.

Reduction refers to reducing either the size of the weed infested site, or the dominance of the weed species on the site. Reduction typically requires a greater cost and labor investment than containment.

Eradication is the complete elimination of a weed species from the site. This strategy usually consumes the greatest amount of time and resources and is applicable mainly to newly-invading weeds that are confined to a limited number of small areas. It may also be appropriate for very sensitive habitats or areas where protected species or their habitats may be affected by weed species.

Recommended control levels for the target weed species are presented in Table 2. The control levels vary with the size of the infested area, reflecting the lowered probability of successful eradication with increasing area, the level of difficulty of eradication of the species, the relative cost of treatment, and other environmental costs of treatment.

5.4 Recommended Treatment Methods

This section summarizes preliminary recommendations for control levels and treatments for the five target weed species that are known or possible in the project area. These recommendations are subject to modification based on new information provided by site inventory and road reconstruction plans. Regular review of the management plan is recommended to incorporate new technology in management techniques, changes in project area weeds and management objectives, and to reflect the successes and failures observed through implementation of the plan.

During the design and planning phases of the road reconstruction project, there may be opportunities to modify the plan to incorporate more aggressive weed management techniques utilizing equipment and labor force required for the reconstruction. The weed plan manager should be an active participant in the planning process for road reconstruction and recreation site improvements to ensure that any opportunities for cost savings or increased control efforts are considered.

Table 2. Recommended Treatment Strategies for Target Weed Species

Target Weed Species	Infestation Size	Control Level	Treatment	Alternative Control Level and Treatment
Canada thistle ***(Cirsium arvense)***				
noxious perennial; creeping roots	spot	eradicate	physical: hand pull roots and shoots	
open disturbed sites; moist soils	small	eradicate	physical: hand pull roots and shoots	
	moderate	contain	mechanical: mow or weed whack 3x per year; multiple	eradicate; mechanical with chemical
	large	contain	mechanical: mow or weed whack 3x per year; multiple years	eradicate; mechanical with chemical
	extensive	contain	mechanical: mow or weed whack 3x per year; multiple years	eradicate; mechanical with chemical
Bull thistle ***(Cirsium vulgare)***				
biennial, taprooted; reproduces by seed	spot	eradicate	physical: hand pull roots and shoots	
open disturbed sites, including logged areas	small	eradicate	physical: hand pull roots and shoots	
	moderate	eradicate	mechanical: mow or weed whack 2x per year	
	large	eradicate	mechanical: mow or weed whack 2x per year	
	extensive	eradicate	mechanical: mow or weed whack 2x per year	
Tansy ragwort ***(Senecio jacobaea)***				
biennial, perennial; spreading roots	spot	eradicate	physical: hand pull roots and shoots	
open disturbed sites, roadsides	small	eradicate	physical: hand pull roots and shoots	
	moderate	reduce	mechanical: heavy cultivation multiple times per year	eradicate; mechanical: mow or weed whack with herbicide
	large	contain	mechanical: mow or weed whack, cultivate perimeter	eradicate; mechanical: mow or weed whack with herbicide
	extensive	contain	mechanical: mow or weed whack, cultivate perimeter	eradicate; mechanical: mow or weed whack with herbicide
Reed canarygrass ***(Phalaris arundinacea)***				
long-lived perennial, rhizomatous; long growing season	spot	eradicate	physical: hand pull roots and shoots	
open disturbed areas; wet to dry soil	small	eradicate/reduce/ contain	mechanical: mow or weed whack 2-3x per year; create perimeter barrier	
	moderate	contain/no control	mechanical: create perimeter barrier	eradicate; mechanical: mow or weed whack plus herbicide
	large	no control		contain; mechanical: perimeter mow or weed whack plus herbicide
	extensive	no control		contain; mechanical: perimeter mow or weed whack plus herbicide
Scot's broom ***(Cytisus scoparius)***				
perennial shrub; tap root	spot	eradicate	physical: hand pull roots and shoots	
open disturbed areas, burned areas, dry soils	small	eradicate	physical: hand pull roots and shoots	
	moderate	eradicate	mechanical: mow or weed whack multiple years; hand pull sprouts	
	large	reduce	mechanical: mow or weed whack multiple years	eradicate; mechanical: mow or weed whack plus herbicide
	extensive	contain	mechanical: mow or weed whack perimeter indefinitely	eradicate; mechanical: mow or weed whack plus herbicide

Canada thistle is a state-listed noxious weed, and is recommended for eradication from spot and small sites. At larger sites it should be contained from spreading at a minimum.

Removal should be by hand pulling (grubbing) of roots and shoots prior to flowering. All plant material should be bagged, removed from the site, and disposed of by burning. The established seed bed will continue to germinate for a few years; repeat treatments will be needed to remove newly sprouted plants.

Containment should be achieved by mowing or weed whacking at least three times yearly, once early in the growing season (4 to 6 weeks after emergence), a second time 4-6 weeks later, and again in late summer. This treatment will need to be repeated annually. Over several years this strategy may succeed in reducing the population

At a higher investment of labor and materials, eradication of Canada thistle on moderate to extensive size sites could be achieved by mechanical removal (mowing or weed whacking) prior to flowering followed by herbicide treatment of basal rosettes. Followup physical treatment will be needed for seeds that germinate each spring until the seed bed is depleted. Herbicide application will require a high investment in labor, if spot applied to protect surrounding vegetation. If broadcast applied, herbicide treatment should be followed with reseeding of the site with fast-growing native species to reduce the opportunities for recolonization of the site by Canada thistle from the seed bed. Application of herbicides may incur additional environmental analysis and may be restricted within sensitive habitats.

Bull thistle should be eradicated from all sites, regardless of size. This recommendation is based on the fact that the species is taprooted and short-lived, and thus has a high potential for successful eradication with relatively low cost.

Removal should be by hand pulling (grubbing) of roots and shoots on spot and small size sites. Plants should be pulled prior to flowering and all plant material should be bagged for removal and disposal by burning. Followup hand pulling will be required for a few years to remove new sprouts.

On larger sites, mechanical removal is recommended, using mowing or weed whacking equipment twice yearly for two to three years. Once the established plants are killed and the seed bed reduced, it should be feasible to followup with hand pulling of newly sprouted plants.

No alternative treatment for eradication of bull thistle is proposed.

Tansy ragwort should be eradicated from all spot and small sites and reduced or contained at larger sites. Although not currently listed by the state of Alaska, this species is considered noxious in many states. The plant produces alkaloids that are toxic to humans and livestock and could affect wildlife.

Removal of tansy ragwort can be accomplished by hand pulling (grubbing) of roots and shoots prior to flowering on spot and small size sites. All plant materials should be bagged for transport and disposal by burning. Repeat treatments will be needed for several years, as the seed beds in established sites are large and long-lived.

Reduction of infestations on moderate size sites can be achieved by deep cultivation several times per year. The seed bed will continue to germinate for several years, and repeat treatments will be required. Containment of large and extensive infestations should be accomplished by mowing or weed whacking to remove stems prior to flowering, along with deep cultivation of the perimeter of the site to prevent spread of the roots. This treatment will need to be repeated indefinitely.

An alternative proposal to achieve eradication of tansy ragwort on larger sites is to use mowing or weed whacking in combination with herbicide treatment. All stems should be cut prior to flowering, bagged for removal from the site, and disposed of by burning. Herbicide should be broadcast applied to resprouting stems and newly germinated seedlings; this treatment will need to be repeated for up to several years. Once densities of ragwort have been reduced, overseeding of the site with fast-growing native herbaceous species is recommended. Eradication of tansy ragwort utilizing herbicides may incur additional environmental analysis. Costs of implementation will be high. If successful, the treatment will not need to be continued indefinitely.

Reed canarygrass should be eradicated at all spot locations to prevent it becoming established and spreading. At small sites, reduction of the population or containment may be appropriate. Moderate size sites should be contained in those situations where uncontrolled spread of canarygrass could affect the quality or function of high value habitats such as fish-bearing wetlands and or streams. At large and extensive sites, no control is proposed for reed canarygrass, due to the low probability of success and high cost of implementation of control methods.

Removal of reed canarygrass from spot locations should be accomplished by hand pulling (grubbing) roots and above-ground stems prior to flowering. All plant material should be bagged, removed from the site, and disposed of by burning. Repeat treatments may be necessary.

On small sites, reduction of the population may be achieved through mowing or weed whacking 2-3 times per growing season. On both small and moderate size sites, spread may be prevented by establishing a buffer zone around the perimeter of the site. After stem removal, apply a very heavy, broad perimeter mulch or a deep cultivation followed by reseeding with fast-growing native herbaceous species. Planting of trees or shrubs along the perimeter, where conditions allow, could also aid in restricting the spread of reed canarygrass.

On large and extensive sites no control for reed canarygrass is recommended, due to the low likelihood of success.

An alternative approach for moderate size sites is to use herbicide in combination with mowing or weed whacking to eradicate the population. Multiple treatments may be necessary, followed by reseeding with native species.

On large and extensive sites, an alternative approach would be to attempt containment of the infestation by using mowing or weed whacking in combination with herbicides to create a canarygrass-free perimeter around the population. This treatment would need to be continued indefinitely.

Scot's broom should be eradicated from all spot, small, and moderate size sites. On large sites, populations should be reduced in size, with a long-term goal of eradication. On extensive sites, containment of the infestation and preventing its spread is recommended.

Removal of Scot's broom should be accomplished by hand pulling (grubbing) roots and shoots on recently established and localized sites and by mowing or weed whacking on moderate size sites. Mature plants are difficult to remove with roots intact, and may need to be cut and retreated in subsequent years. Seed will continue to sprout for several years; seedlings can be hand pulled on annual visits. All seed-bearing plant material should be carefully bagged and removed to avoid dispersing seed. Soil disturbance should be minimized when digging so that seed germination is not stimulated.

On large sites, mowing or weed whacking should be used to remove mature plants. Rather than hand pulling sprouts on these large sites, repeated mechanical cutting is recommended over a period of years until established plants are killed and the seed bed is depleted. All seed bearing material should be carefully bagged, removed from the site, and destroyed by burning.

On extensive sites, containment of the infestation is recommended. Mechanical removal of plants on the perimeter through mowing or weed whacking is recommended, followed by hand pulling of sprouts along perimeter. This treatment will need to be continued indefinitely in order to contain the population on the site.

An alternative treatment for Scot's broom on large and extensive sites is to use a combination of mechanical cutting and herbicide to eradicate the population. This treatment will require either broadcast spraying of the site, which will affect associated plant species, or labor-intensive spraying of individual cut and resprouted stems. Followup hand pulling or spraying of new sprouts will be needed. This treatment offers the possibility of total eradication of Scot's broom from the site after mature plants are killed and the seed bed is depleted.

Disposal of Plant Material. Plant material must be disposed of in a way that ensures that no seeds, roots, or other portions of the plant capable of reproduction, are spread. Plant material should be bagged on site, as it is removed, in large paper or plastic bags. Material may be transported to an approved landfill, or may be destroyed locally.

For this project, it is recommended that plant material be burned at the end of each collection day. Burn sites should be established at rock pits or other unvegetated, hard-packed soil sites where fire danger is low and existing vegetation will not be damaged. Burning on-site is not recommended, due to the potential to affect soil qualities, damage existing native vegetation, and stimulate seed germination from the soil seed bank.

5.5 Monitoring and Reporting

Monitoring is used to document the implementation and effectiveness of treatments and to detect new weed infestations. Monitoring should be performed at least once yearly across the entire project area to detect new infestations of species known from the project area and by weed species not previously detected in the area. Occurrence of new weed species will trigger review of the target weed species list. State or federally listed noxious weeds should be automatically added to the target weed list. Other weed species should be evaluated for addition to the target species list based on their invasiveness and potential to affect project area resources. As new species are added to the list, levels of control and treatment methods should be developed and incorporated into the integrated treatment plan.

Managed weed sites should be monitored twice yearly until control objectives are achieved, and then may be reduced to once yearly. Monitoring of uncontrolled weed sites, such as large, untreated infestations of reed canarygrass, may be monitored on a less frequent schedule. Every two to three years may be enough for the purpose of documenting expansion rate. Monitoring can be scheduled to coincide with the most effective weed treatment times, so that both activities can be conducted on the same field visit.

Data forms for each managed weed site should include the initial mapping and inventory information, proposed control level and proposed treatment. During monitoring visits, the crew should re-estimate the area and level of infestation as well as percent cover of other dominant plant species. Any unusual weather, human activity at the site, or other conditions that may have affected the outcome of the treatment or plant growth should be noted. Each treatment date should have an entry for description of activities. Cost or amount of materials and number of labor hours can be recorded by site to track investment of resources.

Data forms should be completed for any new weed sites or weed species observed in the project area. Early detection of newly introduced weeds is the best way to prevent establishment. New occurrences of target weed species should be reported to the weed plan manager immediately, so that control levels and treatment measures can be applied before the weeds become well established.

An annual report summarizing monitoring results, treatment activity, and effectiveness of treatments to date should be prepared. The integrated weed management plan should be reviewed and updated to include new species, new management sites, and modifications to control objectives and treatment regimes.

5.6 Prevention

Prevention of the spread of weeds will rely on early detection and eradication, as described above, efforts to educate and inform land managers and the public about weed issues, and proper planning and management of ground disturbing activities.

Education and information programs should include weed identification training for field employees and the general public. Weed occurrences and habitats vulnerable to weeds could be represented on an area-wide weed map. Sightings of weeds by field workers and the public should be added to the map and verified by trained weed specialists. Recreation areas and other sites receiving use by the public may benefit from interpretive information regarding the need for weed seed control and steps that recreationists can take to reduce the spread of weeds.

For the Sandy Beach Road Improvement Project, the single most effective method of prevention of introduction and spread of weeds will be careful planning and management of the road reconstruction process. The weed plan manager should be an active participant in the planning process throughout design and construction. The following practices are recommended:

- Clarify the roles and responsibilities of all parties involved in the proposed road reconstruction project. The majority of the land is National Forest System land under Forest Service jurisdiction; a portion of the project area is within the Thorne Bay City limits.
- Minimize ground disturbance through careful planning and design.
- Defer soil disturbance on weed-infested sites until weed treatments have been implemented, if possible.
- Minimize the removal of trees and other roadside vegetation.
- Inspect gravel pits and fill sources to identify weed-free sources; treat weeds at these sites prior to use.
- Reseed all disturbed sites within seven days of completion of ground-disturbing activities, using a native or approved non-native seed mix. Appendix C contains current Forest Service guidance on revegetation of disturbed sites and specifications for seeding and mulching.
- Monitor all reseeded sites and perform fertilization and reseeding as necessary to ensure revegetation of bare ground (three years recommended).
- Require that all seed to be used complies with Alaska Administrative Code requirements to be "free of noxious weeds".
- Require that any mulch (straw, wood chips, hay, etc.) be certified weed-free.
- Utilize performance bonds for subcontractors, responsibility clauses or accountability statements in interagency agreements to assure weed control to a desired condition.

- Require that equipment be cleaned before moving it between noxious weed contaminated areas and weed-free areas, including heavy equipment, hand tools, personal vehicles, and off-road vehicles.
- Inform construction, service and delivery vehicle drivers coming into the project area that vehicles must be weed free.
- Provide contractors, survey crews, inspectors and visitors weed awareness information and weed transport prevention techniques.
- Consider weed risk factors during evaluation of harvest alternatives, road locations, and recreation site locations.
- Analyze each alternative proposed under a NEPA action for its effects on the potential for weed establishment and spread.

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Appendix A

Laws, Policies and Regulations on Weed Management

Federal Plant Protection Act (Title IV of the Agricultural Risk Protection Act of 2000; incorporates Section 2814 of 7 USC 360, the 1990 Amendment to the Federal Noxious Weed Act)

Executive Order 13112 - Invasive Species, February 3, 1999

Federal Seed Act of 1939 (7 USC 1551-1611)

Organic Act of 1944 (7 USC 147a; Subsections a-e of Section 102 repealed by the Plant Protection Act)

Alien Species Prevention and Enforcement Act of 1992

Office of the Federal Environmental Executive Memorandum on Environmentally Beneficial Landscaping, April 26, 1994

U.S. Department of Transportation, Federal Highway Administration Memorandum, Guidance on Implementing Executive Memorandum of Landscaping, November 2, 1995

U.S. Department of Transportation, Federal Highway Administration Memorandum, Guidance on Implementing Executive Order on Invasive Species, August 18, 1999

U.S. Department of Agriculture APHIS, Departmental Regulation number 9500-10, Policy of Noxious Weed Management, January 18, 1990; updated fall 2000

U.S. Department of Agriculture, Forest Service 1998. Forest Service Strategy for Noxious Weeds and Non-Native Invasive Plant Management.

U.S. Department of Agriculture, Forest Service 1997. Tongass Land and Resource Management Plan, Forest-wide Standards and Guidelines for Soil and Water Quality Protection (natural revegetation) p. 4-85

Alaska Administrative Code, Title 11, Chapter 34, Seed Regulations

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Appendix B

Non-Native Plant Species of Prince of Wales Island

(Compiled from Belfield 1997, USDA Forest Service 1997, Brucker 2000a and 2000b)

Scientific Name	Common Name
Apiaceae	**Carrot family**
Ranunculus repens	Creeping buttercup
Asteraceae	**Aster family**
Achillea millefolium	Yarrow
Anaphalis margaritacea	Pearly everlasting
Anthemis cotula	Stinking chamomile
Bellis perennis	English daisy
Chrysanthemum leucanthemum	Ox-eye daisy
Cirsium arvense	Canada thistle
Cirsium vulgare	Bull thistle
Hieracium auranticum	Orange hawkweed
Hypocharis radicata	Hairy cat's ear
Lapsana communis	Nipplewort
Matricaria matricarioides	Pineapple weed
Senecio jacobaea	Tansy ragwort
Senecio vulgaris	Common ragwort
Sonchus asper	Sowthistle
Tanacetum vulgare	Common tansy
Taraxacum officinale	Dandelion
Boraginaceae	**Borage family**
Hackelia jessicae	Nodding hackelia
Caryophyllaceae	**Pink family**
Cerastium tomentosum	Snow-in-summer
Cerastium viscosum	Sticky chickweed
Stellaria media	Common chickweed
Cruciferae	**Mustard family**
Capsella burse-pastoris	Shepherd's purse
Sisymbrium officinale	Tumble mustard
Cyperaceae	**Sedge family**
Dulichium arundinaceum	Dulichium
Fabaceae	**Pea family**
Cytisus scoparius	Scot's broom
Lotus corniculatus	Birdsfoot trefoil
Medicago sativa	Alfalfa
Melilotus alba	White sweet clover

Melilotus officinalis	Yellow sweet clover
Trifolium dubium	Small hop clover
Trifolium hybridum	Alsike clover
Trifolium pratense	Red clover
Trifolium repens	White clover
Geraniaceae	**Geranium family**
Geranium columbianum	Long-stalked crane's bill
Hypericaceae	**St. Johnswort family**
Hypericum perforatum	St. Johnswort
Lamiaceae	**Mint family**
Ajuga genevensis	Erect bugle
Galeopsis tetrahit	Common hemp nettle
Glecoma hederacea	Ground ivy
Prunella vulgaris ssp. vulgaris	Self-heal
Onagraceae	**Evening primrose family**
Epilobium adenocaulon	Sticky willowherb
Plantaginaceae	**Plantain family**
Plantago lanceolata	Ribgrass
Plantago major var. major	Common plantain
Poaceae	**Grass family**
Agropyron gigantea	Redtop
Agrostis stolonifera	Creeping bentgrass
Agrostis tenuis (A.capillaris)	Colonial bentgrass
Alopecurus geniculatus	Meadow foxtail
Arrhenatherum elatius	False oat grass
Bromus tectorum	Cheatgrass
Dactylis glomerata	Orchard grass
Deschampsia danthonoides	Annual hair grass
Deschampsia elongata	Slender hair grass
Elytrigia repens (Agropyron repens)	Quack grass
Festuca arundinacea	Tall fescue
Festuca elatior	Meadow fescue
Festuca rubra	Red creeping fescue
Holcus lanatus	Velvet grass
Hordeum brachyantherum	Meadow barley
Lolium perenne	Perennial ryegrass
Phalaris arundinacea	Reed canarygrass
Phleum pratense	Timothy
Poa annua	Annual bluegrass
Poa compressa	Canada bluegrass
Poa pratensis	Kentucky bluegrass
Poa trivialis	Rough stalk bluegrass
Polygonaceae	**Smartweed family**
Polygonum cuspidatum	Japanese knotweed
Rosaceae	**Rose family**
Crataegus monogyna	European hawthorn

Sorbus aucuparius	European mountain ash
Scrophulariaceae	**Figwort family**
Digitalis purpurea	Foxglove
Veronica chamaedrys	Germander speedwell
Veronica serpyllifolia ssp. *serpyllifolia*	Thyme-leaved speedwell

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Appendix C

Attachment 1: USDA Forest Service Tongass National Forest, Forest Supervisor's Memo on Interim Guidance on Revegetating Disturbed Sites on the Tongass National Forest, June 16, 1999

United States Department of Agriculture | Forest Service | Alaska Region Tongass National Forest | 648 Mission Street Ketchikan, Alaska 99901 907-225-3101 FAX 907-228-6215

File Code: 2600/2500 **Date:** June 16, 1999
Route To: 7700/2300/2400
Subject: Revegetating disturbed sites on the Tongass National Forest
To: Tongass Leadership Team

Forest policy regarding revegetation of disturbed sites, erosion control, fire rehabilitation, riparian restoration, forage enhancement and other revegetation projects directs us to "Use native species of seeds and plants in revegetation projects where seeding or planting is appropriate. Native plant material sources include commercial nurseries, agency native seed programs and local seed collection" (TLMP 1997 - Watershed Resources Improvements I.3). At this time, there are no known commercial nurseries that supply seed materials native to Southeast Alaska. Tongass N.F. ecology and botany specialists are actively working on the development of commercially available native seed through the Forest's Native Seed Program. Until native seed materials become commercially available, revegetation projects should use the guidance outlined below.

Native Plants

1. Use native plant materials derived from wild collections for small-scale (10 acres or less) projects including, but not limited to, trails, recreation sites, and riparian and wetland revegetation projects. **This guidance is especially important when projects occur within wilderness, remote, semi-remote or roadless LUDs.**

2. **Only** use the so-called "native" seed mixture listed below for small-scale projects with extensive disturbance (recreation projects, other areas of heavy disturbance less than 10 acres in extent). This mixture, though native to Southeastern Alaska, is composed of seed material originally collected outside our EcoSubregion. Because it is important to ensure that native seed sources be derived from the EcoSubregion in which they will be planted, using this seed mixture should be kept to a minimum.

50% Fawn tall fescue (*Festuca rubra*)
30% tufted hairgrass (*Deschampsia cespitosa*)
20% annual ryegrass (*Lolium multiflorum*)
Add bluejoint (*Calamagrostis canadensis*) if available

Non-native Plants

1. **Do not** use Reed Canary Grass (*Phalaris arundinacea*). This grass has been a standard component in the seeding mixture for the Tongass N.F. for 30 years. Due to its invasive tendencies, **its use will be discontinued entirely. This direction is non-negotiable.** Please ensure this species is removed from all contract language regarding seeding mixtures for revegetation of disturbed sites (i.e. all road and recreation contracts). Ecology and Botany specialists will assist engineering and recreation personnel in writing new contract specifications for seeding requirements.

2. When available, use the following non-native seed mixture for large-scale projects (greater than 10 acres):

40% Fawn tall fescue (*Festuca rubra*)
20% annual ryegrass (*Lolium multiflorum*)
40% alpine bluegrass (*Poa alpinum*)

Application rates for this mixture is 50 lbs/acre (55 kg/ha). Application rates greater than this are unnecessary and not advised. A complete fertilizer (20-20-10) should be applied at a rate of 250-300 lbs/acre (270-325 kg/ha). A fertilizer mixture of nitrates (NO_3^-) and ammonium (NH_4^+) compounds (such as ammonium nitrate or urea) may also be used in place of the complete fertilizer.

3. Other non-native seeds that may be used in place of any of the above species are listed below:
   Boreal red fescue (creeping red fescue *Festuca rubra*)
   Arctared fescue (creeping red fescue *Festuca rubra*)

   Please consult with the Forest Ecologist or Botanist for information on any species of interest not listed above.

4. For situations where short-term revegetation is needed, but where native plant materials will either invade naturally or will be planted within one to two years, use the following seed varieties:
   a. Annual ryegrass (*Lolium multiflorum*) (50 lbs/ac. or 55 kg/ha)
   b. REGREEN (*Triticum aestivum* X *Agropyron elongatum*) - a sterile wheat hybrid: $3.00/lb
   c. Buckwheat (non-persistent, short-term soil builder) *Fagopyrum esculentum:* $.50/lb.

These can be mixed and applied by hydroseeding or by broadcasting. Consult seed distributors for proper application rates for REGREEN and sterile buckwheat.

Please use the above guidance to help determine the best revegetation techniques for your specific project. We are very close to providing more options in terms of using native plant materials. Our first native seed growing contract will be sent out for bid this fiscal year; we may have native seed commercially available in 2002. In the meanwhile, use the above mentioned non-native plant materials sparingly. While we are actively trying to prevent introduced plants from becoming invasive, we still have the need to stabilize our soils for erosion control; using non-native plants is one of our only options at this time. Where there is high likelihood of natural regeneration which will meet management objectives, we suggest no seeding be done, or using the options outlined in number 4 above.

I appreciate your understanding and participation in the changes that are taking place in the field of watershed protection. Again, I would like to emphasize that contracts will need to be revised with this new guidance. ***Please ensure all contracts having seeding specifications use the above information.*** If you have any questions on this information, please direct your calls to Patti Krosse at (907)228-6272.

/s/ Gene Eide (for)
THOMAS PUCHLERZ
Forest Supervisor

Author: eco, pkrosse, 06/15/1999 03:26pm
Concur: eco, pkrosse, 06/15/1999 03:30pm
Concur: fs, ystanley, 06/15/1999 03:58pm
Concur: eco, lmeshew, 06/16/1999 09:56am
Author: eco, pkrosse, 06/15/1999 03:26pm
Concur: eco, pkrosse, 06/15/1999 03:30pm
Concur: fs, ystanley, 06/15/1999 03:58pm
Concur: eco, lmeshew, 06/16/1999 09:56am

Attachment 2: USDA Forest Service, Tongass National Forest, Special Project Specifications on Seeding and Mulching, 2000

Special Project Specification
625.1 (02/00) – Seeding & Mulching

Description

625.01 Work. Prepare seedbeds, and furnish and place required seed, fertilizer, limestone, mulch, net, and blanket material.

Materials

625.02 Requirements. Ensure that materials meet the requirements specified in the following subsections:

Agricultural Limestone 713.02
Erosion Control Mats, Roving, & Geocell.....713.07
Fertilizer 713.03
Mulch 713.05
Seed 713.04
Stabilizing Emulsion Tackifiers.....713.12
Water .....725.01(b)

Construction

625.03 Seeding Seasons. Observe the normal seasonal dates for seeding, as shown in the SPECIAL PROJECT SPECIFICATIONS. Do not apply seeding materials during windy weather or when the ground is excessively wet or frozen.

The normal seasonal seeding dates for seeding are April 15 to September 15.

625.04 Soil Preparation. Finish the areas to be seeded, as required by other applicable sections, to the lines and grades SHOWN ON THE DRAWINGS. Restore areas that are damaged by erosion or other causes. Ensure that the surface soil is in a roughened condition favorable for germination and growth. ~~When required, apply limestone uniformly at the rate given in the SPECIAL PROJECT SPECIFICATIONS, either before or after soil preparation.~~

625.05 Application Methods for Seed & Fertilizer~~, & Limestone~~. To control erosion, apply seed to disturbed soil and slopes within 30 days of disturbance. If the slopes have not been finished, apply the seed by the dry method as an interim erosion control measure. Apply fertilizer with the seed when specified in the SPECIAL PROJECT SPECIFICATIONS.

The following methods may be used to place material:

amounts and mixtures shown in the SPECIAL PROJECT SPECIFICATIONS to produce a slurry, then apply it under pressure at the rates specified in the SPECIAL PROJECT SPECIFICATIONS. When wood cellulose or grass straw mulch materials are to be incorporated as an integral part of the slurry mix, add them after all other materials have been thoroughly mixed in the tank.

(a) Hydraulic Method. Mix the seed or seed and fertilizer with water in the Use an inoculum for hydraulic seeding that is four times what is recommended for dry seeding.

(b) Dry Method. Use mechanical, landscape, or cultipacker seeders, seed drills, fertilizer spreaders, or other approved mechanical seeding equipment to apply the seed or seed and fertilizer in the amounts and mixtures shown in the SPECIAL PROJECT SPECIFICATIONS.

Spread dry fertilizer ~~and ground limestone separately~~ at the rates given in the SPECIAL PROJECT SPECIFICATIONS. Incorporate them in a single operation to the required depth in the areas SHOWN ON THE DRAWINGS.

Hand-operated seeding devices may be used to apply dry seed and fertilizer ~~and ground limestone.~~

Apply seed and fertilizer together during the normal seeding season to all areas disturbed during construction. (Final Seeding)

mixture:

(1) Perennial Seed: Apply seed at the specified kilograms per hectare:

Species	kg/ha	% Mixture	Pure Live
*Fawn Tall Fescue	22	40	85%
Annual Ryegrass	11	20	85%
**Alpine Bluegrass	22	40	85%

*Boreal Red Fescue or Arctared Fescue may be substituted.
**May be deleted from the mixture if unavailable and approved by the CO. If the deletion is approved, the mixture will be adjusted to 60% Fescue and 40% Ryegrass

(2) Fertilizer: Apply fertilizer at the specified kilograms per hectare:

Type		kg/ha
10-20-10	(%Nitrogen,%Phosphorus,%Potassium)	225
46-0-0	Nitrogen urea	115

Apply seed and fertilizer together during construction phases and/or outside of the normal seeding season to all areas disturbed during construction. (625.05 Erosion Control)

mixture:

1) **Annual Seed**: Apply seed at the specified kilograms per hectare:

Species	kg/ha	% Mixture	Pure Live
Same as shown above			

(2) **Fertilizer**: Apply fertilizer at the specified kilograms per hectare:

Type	kg/ha
Same as shown above	

Apply erosion control seed and fertilizer as, specified above, to any areas of unusually high erosion potential (stream sites, slides ect.) which are identified by the CO. This seeding shall be accomplished within 24 hours of notice.

625.06 Application of Mulch. The following methods may be used to apply mulch:

(a) Hydraulic Method. Hydraulic equipment that uses water as the carrying agent may be used to apply wood cellulose or grass straw fiber mulch, tackifier, and fertilizer in a single operation. Continuously agitate the materials to keep them in uniform suspension throughout the distribution cycle. Ensure that the discharge line evenly distributes the solution to the seedbed. Do not mulch where there is free surface water. Start application to areas SHOWN ON THE DRAWINGS at the top of the slope and work downward. If necessary, use extension hoses to reach the extremities of slopes. Apply at the rate specified in the SPECIAL PROJECT SPECIFICATIONS.

Apply mulch at the rate of 1350_ kilograms per hectare.

(b) Dry Method. After completion of seeding and fertilizing, unless otherwise indicated in the SPECIAL PROJECT SPECIFICATIONS, apply mulch uniformly at the rate specified in the SPECIAL PROJECT SPECIFICATIONS.

Apply mulch at the rate of _N/A___ kilograms per hectare.

When a tackifier is used for mulch, apply the material at the rate specified in the

SPECIAL PROJECT SPECIFICATIONS. Immediately distribute it evenly over the mulch. Prevent asphalt adhesive materials from marking or defacing When a tackifier material at the rate specified in the
structures,
appurtenances, pavements, utilities, or plant growth.

625.07 Installation of Netting & Erosion Control Blankets. Install nettings and erosion control blankets as SHOWN ON THE DRAWINGS and in accordance with the manufacturer's recommendations.

625.08 Care During Construction. Protect and care for seeded areas until the work is finally accepted. Repair all damage to seeded areas caused by construction, without additional compensation.

Measurement

625.09 Method. Use the method of measurement that is DESIGNATED IN THE SCHEDULE OF ITEMS.

Base area computations on surface measurements.

No separate measurements will be made for seed and fertilizer used for interim erosion control.

Payment

625.10 Basis. The accepted quantities will be paid for at the contract unit price for each PAY ITEM DESIGNATED IN THE SCHEDULE OF ITEMS.

Payment for seed and fertilizer used for interim erosion control will be considered incidental to other pay items in this contract.

Payment will be made under:

Pay Item		Pay Unit
625 (01)	Seeding, _____ method (without mulch)	Hectare
625 (02)	Seeding, _____ method (with mulch)	Hectare

625 (03)Mulch (supplemental application).....	Ton
625 (04)Fertilizer (supplemental application).....	Ton
625 (05)Seed mix (supplemental application)	Kilogram
625 (06)Netting, type _____	Square Meter
625 (07)Erosion control blanket, type _____	Square Meter

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